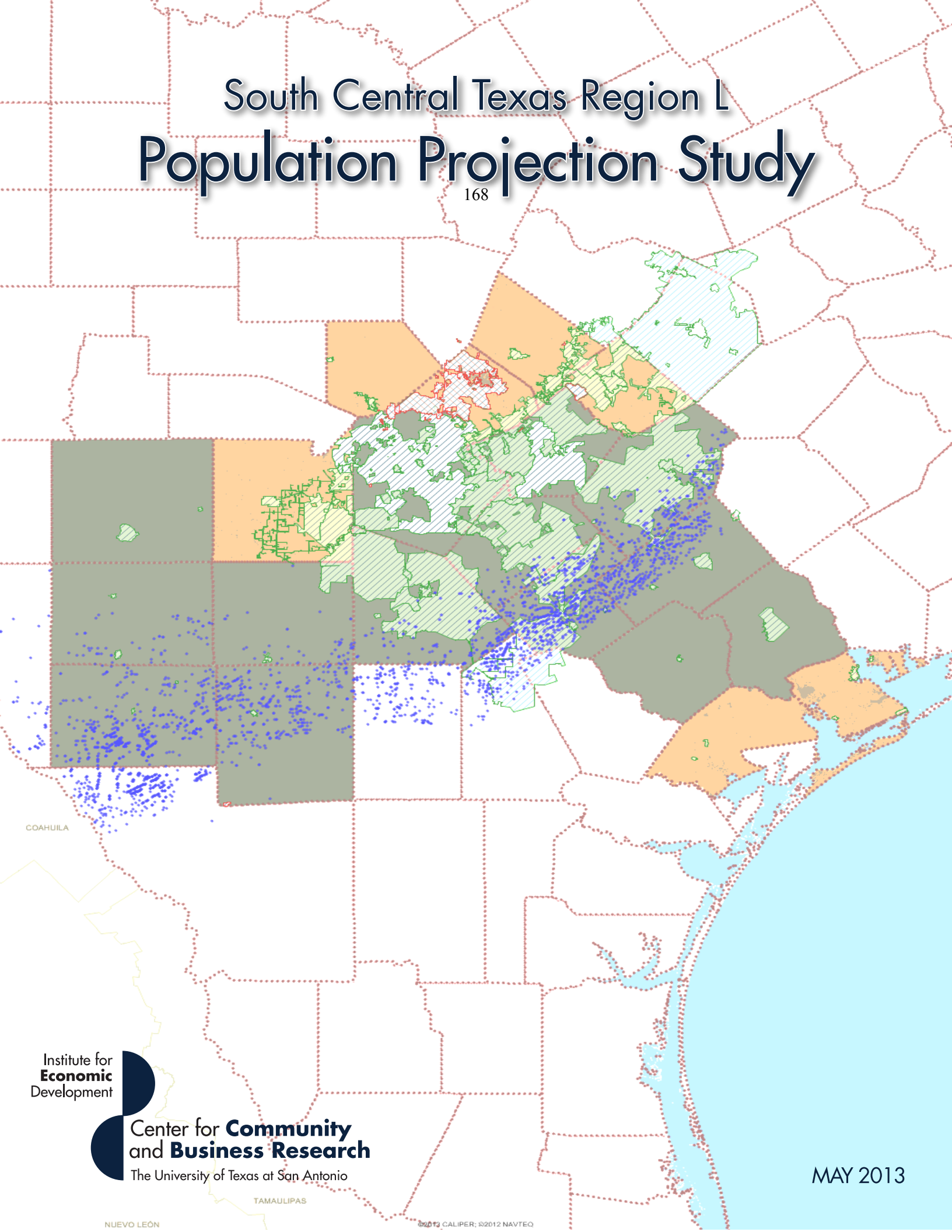


South Central Texas Region L Population Projection Study

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Institute for
Economic
Development

Center for **Community**
and **Business Research**

The University of Texas at San Antonio

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ABSTRACT

This study, by UTSA's Center for Community and Business Research at the Institute for Economic Development, was done at the request of the San Antonio River Authority, for the use of water planning groups in South Central Texas Region L counties. With the aid of experts, peer review literature, government websites and database, the staff at the CCBR has collected, analyzed and summarized data findings pertaining to population projections for the Region L counties: Atascosa, Bexar, Caldwell, Calhoun, Comal, DeWitt, Dimmit, Frio, Goliad, Gonzales, Guadalupe, Hays (southern half), Karnes, Kendall, La Salle, Medina, Refugio, Uvalde, Victoria, Wilson and Zavala. With the need for water user groups to use population projections for several decades from the present, as well as the unexpected influx of thousands of people in relation to Eagle Ford Shale activity, representatives of Region L contracted with the CCBR for an objective study concerning population projections for the area. The Texas Water Development Board allows for a review of population projection data, with criteria for adjustment that includes documentation of the need for a census recount, significant rate difference, or substantial rate difference in population change. This study has compared results and findings with the standard population projection data offered by the Texas State Data Center, prepared by the Office of the State Demographer, which lists three scenarios for fertility, mortality and migration: normal (0), conservative (.5) and aggressive (1). Results show that there is indeed evidence for many counties to request a recount from the United States Census Bureau, as well as evidence of significant and substantial rate change differences in population change that can result in population projection numbers that are different from those currently published by the State. As the State is aware of the economic activity and associated population movements into the Region L area, the Office of the State Demographer has been updating available data and analysis. With this in mind, this study also includes information for understanding some of the methodology for population projections, discussion of how to read the outputs and make judgments on which data best reflects the situations the Region L counties face and background about the economic circumstances these communities face in relation to the Eagle Ford Shale. This research team hopes that the principles in this study will serve not only the current need for planning documentation, but also as a guide for future planning and analysis by those who need an understanding of how to navigate population projection materials and associated data.

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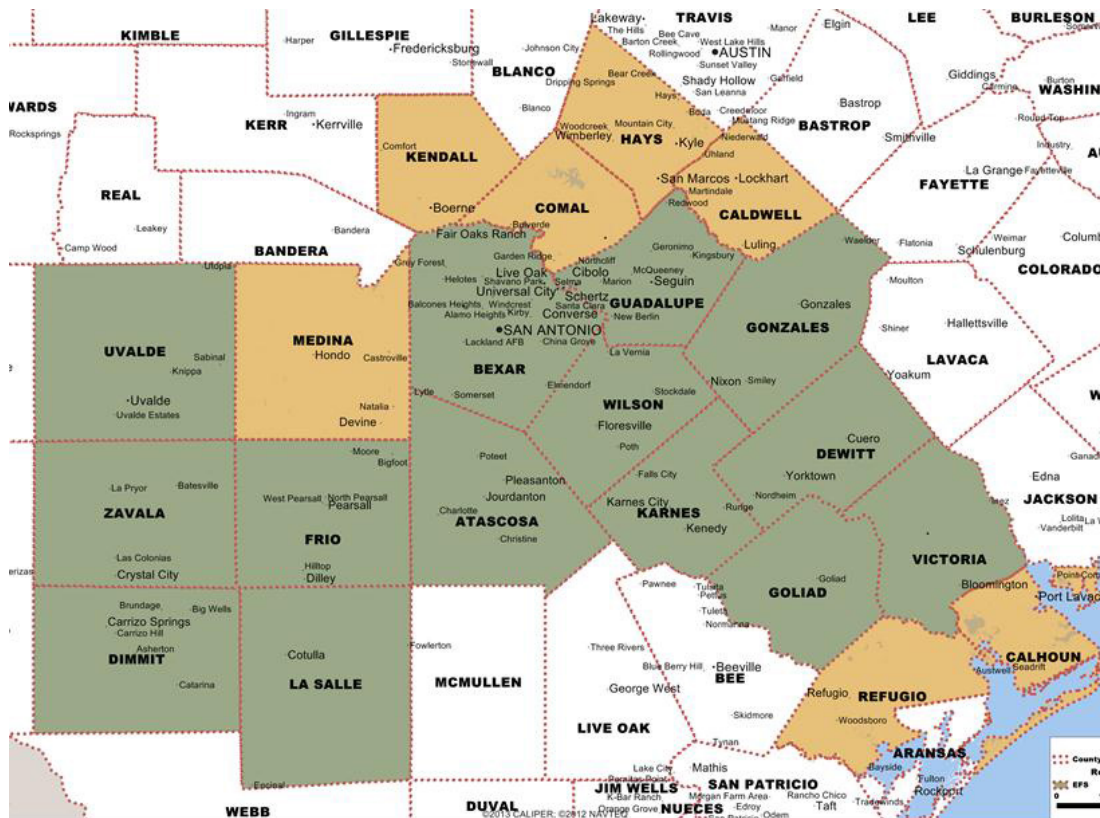
SECTION I

The following section discusses the setting and purpose of the study concerning population projections based on employment, housing units and school enrollment for Region L.

Introduction

A Focus on Texas Water and Population

The South Central Texas Region L Water District consists of 21 counties that include Atascosa, Bexar, Caldwell, Calhoun, Comal, DeWitt, Dimmit, Frio, Goliad, Gonzales, Guadalupe, Hays (southern half), Karnes, Kendall, La Salle, Medina, Refugio, Uvalde, Victoria, Wilson and Zavala. These counties are outlined in the map below.



Map 1: South Central Texas Region L Map; source: CCBG GIS

The Texas Water Development Board, of which Region L is a member, asks each region to perform residential water usage planning for the counties and water user groups (WUG) in their district as part of an overall statewide planning and reporting system. Planning documents utilize population projections calculated under the auspices of the State Demographer of Texas and the Texas State Data Center. Documents and information pertaining to water planning and related factors and processes are available at the level of each region and from the Texas Water Development Board. The factors involved in planning are the identification of population numbers for the projection of population for the planning period. Activities such as water supply development and treatment, usage, and other management processes require an understanding of who, where, why and from what water resources are acquired and used. Identified residential populations play a large part toward this understanding.

The Texas State Data Center (TSDC) provides data that supports standardization of population information used by Regional water planning groups for TWDB reporting. The State Demographer, through TSDC, using standard accepted calculations related to birth, mortality and in/out migration rates, regularly publishes three forecasts for population growth trajectories. One forecast follows a normal migration pattern, one follows a conservative migration pattern, and one follows an aggressive migration pattern. Data used in these projections is sourced from the United States Bureau of the Census' decennial census, as well as from population figures found in periodic Census surveys, such as the American Community Survey and Community Population Survey (Texas State Data Center, Office of the State Demographer, 2013; US Bureau of the Census, 2012). The data produced is recognized by the State of Texas as a valid and reliable source. It is utilized by many levels of government for planning and policy purposes (Rayer & Smith, 2010). Furthermore, these projections are used in calculations of water usage by regional water boards in relation to planning, authorized and accomplished in conjunction with the Texas Water Development Board and its policies. A secondary use for this study is to track and understand current population trends, at the county level, in order to assist government agencies and representatives in planning and policy-making.

Under normal circumstances, projections issued by the Office of the State Demographer are workable for all parties involved in water planning and policy. However, increased economic development, closely associated with the oil and gas extraction industry in the Eagle Ford Shale (EFS) area of South Texas, has drastically altered the economies and demographics of Region L. The Center for Community and Business Research (CCBR) at the University of Texas at San Antonio (UTSA) has conducted a number of economic impact analyses related to the EFS since 2011. These studies have focused on industry activity, workforce, and other effects oil and gas drilling has had on the region (CCBR, 2012, 2013). According to the 2012 Economic Impact of the Eagle Ford Shale study, released in March of 2013, Eagle Ford Shale activity generated over \$61 billion in economic impact and supported 116,000 jobs in the 20-county area of study. It is projected to increase to \$89 billion and support 127,000 jobs in 2022. This activity has led Region L representatives to believe that alternate population projections may illustrate a trajectory of population growth different from those provided by the Office of the State Demographer.¹

¹ Rayer & Smith, 2010: "accuracy is generally the primary criterion used in evaluating forecasting techniques (Yokum and Armstrong 1995). Planners, however, must consider a variety of additional factors such as costs of production, timeliness, ease of application and explanation, provision of necessary detail, validity of assumptions, usefulness as an analytical tool, political acceptability, and internal and external consistency (Smith, Tayman, and Swanson 2001; Murdock et al. 1991). As Sawicki (1989, 53) put it, "Accuracy is not everything. Further complicating the issue is that planners are often called upon to balance the merits of pure or objective forecasts against those of normative or advocacy forecasts (Isserman 2007; Skaburskis and Teitz 2003; Wachs 1989). For advocacy purposes, forecasts need not be accurate to have their intended political effects (Wachs 2001). In some instances, in fact, greater accuracy may be counterproductive because less objective forecasts may help projects gain approval or funding (Flyvbjerg, Skamris Holm, and Buhl 2005). Planners may also need to consider the role of community participation (Hopkins and Zapata 2007) and the involvement of policy makers (Klosterman 2007) in the forecasting process. Planners thus face a variety of conflicting interests and objectives when constructing or evaluating population forecasts. Regardless of the circumstances, however, well-informed decisions require at least a basic assessment of the expected level of forecast accuracy. Planners must therefore be knowledgeable regarding typical error patterns and how those patterns vary from one forecasting technique to another and according to the characteristics of the geographic areas being forecasted. Although other considerations are important, accuracy

Provisions provided by the Texas State Water Board stipulate that verification of significant rate differences and substantial rate changes, in addition to alternate population projection numbers, including requests for U.S. Census recounts for an area, can be submitted in a formal review process in order to justify a review of data used in water-related planning and policy decisions (Texas Water Development Board, 2013; see: Appendix) For the upcoming state planning session, being held in the summer 2013, the Texas Water Development Board has enhanced this process to provide time and attention for studies, such as this one, to be performed and submitted. This supports a cooperative environment of not only information and goal exchanges, but of an active working partnership between The State of Texas and local governing bodies, whose goals to provide good and reliable water sources for Texans and Texas development are fundamentally similar.

In this report, alternate population projections have been calculated from data sources outside of population projections from the State Demographer's office, based from U.S. Bureau of the Census data, and have been compared to population projections provided by the Office of the State Demographer for all counties within Region L. Note that as data and analysis in this study is at the county level, only half of Hays county is within Region L boundaries, but is treated as a whole county. Also, data from urban areas in sparsely populated counties may represent the county as a whole. Likewise, although water user groups (WUG) may use parts of this study for their documentation, the data and analysis was done at the county and not the WUG level. Subset analysis is the responsibility of representatives of Region L. The population projections, used for comparison by this study, are the 2010-2050 scenario sets that were available at the instigation of this study and not the updated, recently released versions that have been average-trended out to 2060 or 2070. However, the same comparison principles discussed for the original TSDC and this study's sets, hold and can be used when comparing this study's results with other newer sets.

Data utilized by the CCBR for this study is publicly available and was acquired through internet, printed format, and freedom of information (FOI) requests where necessary. FOI requests undertaken for this study are listed in the appendix although many went unanswered or were not answered in time for this study (see: Appendix). In order to reflect recognized methodology and take into account known issues in demographic assessments, citations from the State Demographer, U.S. Census methodology, and other researchers specializing in population projection and extraction industry impacts were used in the study. The CCBR respects and honors the population projections published by the Office of the State Demographer and have continued to seek counsel from the State Demographer in the preparation of this study. Likewise, the CCBR has sought to make the process as transparent as possible for understanding and for enabling replication, where desired, by those who will use this study for policy making purposes

This study seeks to be informative by

- Discussing what a population projection actually is, and what it symbolizes
- Illustrating how the information in the study can be used for Region L report use
- Methodology information to help Region L members understand choices and judgments related to population projection data, analysis and inferences

cannot be ignored and often plays a major role in determining whether a particular forecasting technique is judged to be "professionally acceptable."

- Identifying adjustment criteria and documentation for the review process and supplying information for those criteria and documentation factors
- Providing evidence and support for possible requests for population recounts from the U.S. Census
- Providing support for significant and substantial rate differences in population changes in Region L, along with circumstantial activities and processes that may be affecting population change
- Providing support for various scenario choices provided by the State Demographer's population projections
- Discussing methodology related to the State Demographer population projections that may render them a second choice or not appropriate, rather than a first choice for Region L situations
- Discussing methodology related to the data collection and analysis used in this study
- Discussing data sources that can be instituted and followed up at local levels to record and track data related to population changes for future use
- Discussion on how to read and assess results and comparisons for informed use of the study in current and future comparative analysis

Scope

This study was initiated at a request by the San Antonio River Authority (SARA) to analyze unanticipated population impacts from the Eagle Ford Shale activities. More specifically, this study develops population projections that can be used for water usage planning related to the area. Region L represents the water user groups (WUG) affected, either directly or indirectly, by sudden unanticipated population changes since drilling began in 2008. It is shown in a section of the Texas Water Development Board WUG regional map below. With the Austin corridor to the north, Houston shipping and trade area to the east, coastal areas to the south east, and the border with Mexico to the south west, Region L reflects a large portion of the state with opportunities for development. Following the immense growth of the Dallas-Fort Worth region, despite the economic downturn that has gripped the nation over the past few years, Region L has the potential to become the next gateway to the expansion of transportation, financial, resource, employment and industrial growth for Texas; spurred by the massive investment in Eagle Ford Shale.

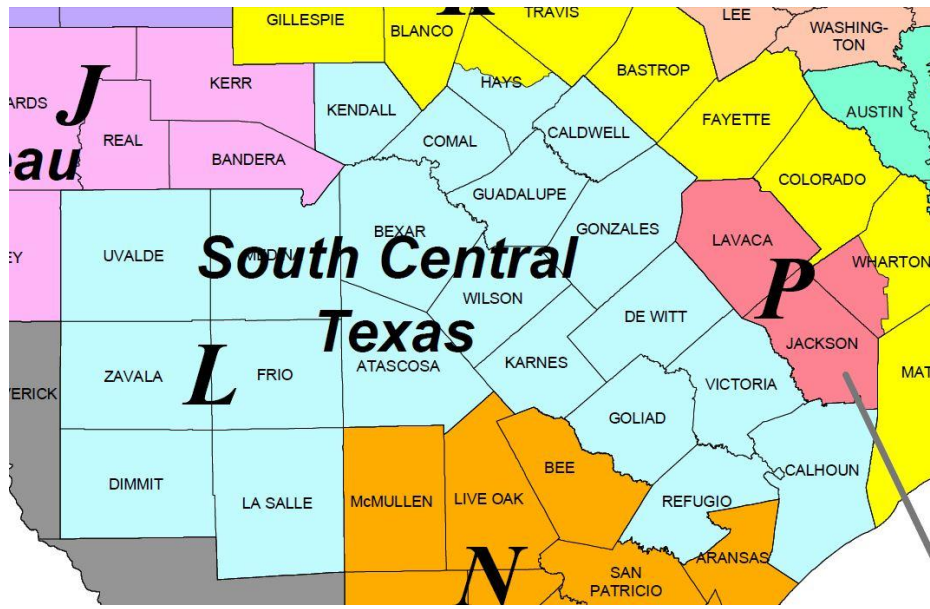


Figure 1: Map of Region L; source: Texas Water Development Board

To assist SARA, the CCBR at The University of Texas at San Antonio’s Institute for Economic Development, produced three sets of population projection data for the Region L counties. Data based on employment, school enrollment and housing unit numbers were used to calculate multipliers from which population projections were made out to 2050. These were compared to each other and against the State Demographer’s normal migration (0), conservative migration (0.5), and aggressive migration (1.0) population projections. By using different methods to develop population projections, this study has given planners a set of cross-validated projections for a more robust projection of future water needs, concerning residential population of the area.

Background

Population Projections Discussion

Standard methods used for calculating population projections consist of conducting an enumeration (U.S. Decennial Census), sampling a population (American Community Survey, Community Population survey) and determining a projection based on the findings. Population projections published by the State Demographer use a “B/D/M” formula, called a “cohort component” formula, whereby patterns for fertility (births), mortality (deaths) and in-/out- migration are applied to a base population figure to project a population into the future (TSDC, 2012). Because populations consist not only of people, but of people added to and subtracted from the population through birth, death, and movement in and out of an area (migration), standard equations used for projections attempt to assess “rates” of birth, mortality and in/out- migration, rather than provide static counts (Cai, 2007; Murdock, Hwang, & Hamm, 1995). The projection formula takes standard demographic assumptions regarding birth rates, mortality rates and in/out migration, relative to geography and socio-economic trends, and applies those rates of change, over time, to arrive at population estimates (USBC, 2012). This allows behaviors directly related to the components of fertility, mortality and movement to be reflected in most population projections (Chesnais, 1990).

Population projections may be assessed when calculated alongside other metrics, such as the number of people in the workforce (employment), public school enrollment (“school age child” or SAC), and the number of housing units in a particular area (Cai, 2007; Murdock, et al., 1995). One person counted as “workforce”, “SAC”, or one “housing unit” likely reflects a social unit such as a family of multiple people. Those metrics are often multiplied by a standard “population multiplier” to arrive at an estimated house hold size, used to project population figures inclusive of the person and their associated family group (Chesnais, 1990; TSDC, 2012; USBC, 2011; Burchell, Listokin, Dolphin, 2006).

By examining several basic population characteristics, each serving as proxies for actual population (Cai, 2007), population projections can be assessed for accuracy with regards to one another and to census-based projections. Likewise, this methodological practice provides insight into probable ranges of population change. In linear terms, the confidence intervals within which the data points from those characteristic-based population projections fall, can reveal similarities based on overlap or differences if there is no overlap. For this study, multiple layers of data concerning each characteristic were triangulated in order to build profiles that aid in analyzing comparisons on a level more revealing than that examining only figures and graphs.

In some cases, there may be overlap during a particular time period and not another, as the gain or loss trajectories, predicted by particular population projections, reveal different rates or direction of change. A direction of change may be expressed as population loss (negative) or gain (positive). If there is excessive randomness in the spread of data points (i.e. they stop following a predictable pattern) in the space that expected values could fall, the confidence interval becomes very wide and generally unworkable, as almost any value could be suggested. In such a case, “prediction” becomes worthless as a tool and unreliable for modeling the population transition changes. In other calculations, projection results, though mathematically sound, may seem ludicrous when compared to realistic circumstances. For example, a region may have a high out-migration rate prior to the 2010 census and in actuality experiences a major influx of workers or families. An aggressive projection would predict rapid depopulation in 40 years, while a conservative projection would indicate more stability.

There are inherent issues with population characteristics given that each reflects a unique aspect of a population, rather than a uniform generality across all people. For example, there may be more than one school aged child (SAC) or employed individual per housing unit, more than one family per housing unit, or groups of SAC that travel between two housing units. Some family units may include all three characteristics: workforce, SAC, and housing unit, or none of them. It has been demonstrated that extraction industry based economies in the United States have attracted a mobile or transitory workforce that may not “show up” in standardized data (Bangsund & Hodur, 2012, 2013; Burchell, et al., 2006; Deller, 2013). Some of this dilution is caused by the enumeration practices of the U.S. Bureau of the Census. Hotel, RV and other temporary lodgings are not counted, while mobile workers are counted from an assumed residential home base and not from a working address (USBC, 1985). Region L counties have attracted an influx of workers who live and work near the job site, but are based out of mobile or temporary housing, or commute from a distant home location.

Other issues, in addition to the difficulty in enumerating mobile workforce members, are the variation over time, job-site crew size and changes in workforce density due to extraction-sites’ stages of development or market pressures on extraction/workforce activities. This complicates the consistency of population projections due to the underlying variation from which those projections are calculated. Though transitory, this unique population generates a growing and unexpected demand on county resources and it needs to be reflected in county planning. Visible to residents of Region L counties, but invisible to common population tracking methods, these unique populations have spurred recognition for the need to identify ways to corroborate this, as well as other elastic populations and their impacts. Tracking punctuated populations is an area of demographic research that is still a developing theory and methodology (Rayer & Smith, 2010).

Because this study sought to examine source data outside of the U.S. Bureau of the Census population estimates, data sources illustrating demographic characteristics commonly used in demographic science were identified and collected. An examination of demographic science literature was conducted in order to identify characteristic types and to identify those that were recognized through testing to be valid, reliable, and to maintain predictable relationships with actual population counts (Smith, 1986; USBC, 1985, 2012; Cai, 2007; Rayer, Smith & Tayman, 2009; Rayer & Smith, 2010). The population characteristics utilized in this report, employment, housing units, and school enrollment, are supported by demographic science literature and recommended by the Office of the State Demographer (TSDC, 2012). Data across annual periods was collected from a variety of publicly available data sources. Where source classification varied, data was compiled into similar units so calculations would be uniform across all data types. After cleaning and comparing data, trajectories based on a population multiplier, reflecting persons per household size (PPH), were computed out to a target year in order to calculate population projections.

This study used recommended practices where possible, and worked to experiment with new methods of unique population tracking, such as dynamic mapping and target prediction, in order to understand where movements and densities have been occurring. Some of these tools are more descriptive than empirical due to the limitations associated with tracking mobile populations. However, these descriptive methods have value in graphically documenting the transient workforce, in addition to helping identify layers of temporary and permanent populations, areas of effect and trends over time. Rich local anecdotal material presented in this study illustrates social variables such as distance and community resources. The wide diversity of experience currently found across the large Region L area may not be reflected by general projection methodologies (Cai, 2007; Bangsund & Hodur, 2012; Center for Social Research at North Dakota State University, 2012.). This diversity calls for a more tailored approach that allows flexibility so that unique, localized changes in the region can be captured and related processes better understood.

A population is never an actual number that can be identified due to its ever changing size. Likewise, a projection cannot be a static number taken on its own. There must be a framework in which the projection makes sense and can be described. Therefore, this study sought to frame assumptions, select data with caution, and compare projections based on differing demographic characteristics, highlighting significant variances, or in some cases, noting substantial similarities. As with all statistical analysis, numbers paint a picture of what may be more or less likely, rarely exhibiting a state that can be discussed as a given, and that is very evident in population projections. Looking behind the numbers in order to see what they might represent is important. By triangulating data results numerically, from a graphical and situational standpoint, information on population changes can be used more sensibly and a feel, not only for what has been happening but what cycles and changes are likely to occur, can lead to more informed choices and planning activities.

One goal of this study was to provide information for the “accepted criteria” and “documentation for adjustment” made possible in review paperwork distributed by the TWDB for Regions desiring to change population projection data used for water usage planning documentation (TWDB, 2013). In addition to primarily requesting a recount from the U.S. Census and submitting documentation of that request in the review packet to TWDB, two other types of information are recommended by TWDB in a request to use other data for population projections. These two information types, which are “significant” and “substantial” rates of change, can also be used to support a request for recount. In analyzing projections, CCBR examined whether or not the trajectories and rates of the projections were “significantly different” based on migration, an accepted criteria for adjustment (TWDB, 2013). A significant difference means that, outside of chance, projections based on alternate data should be considered. A non-significant difference means that, even if charting seems to show that the projections based on alternate data look like they are higher or lower, the difference may not be statistically different from the projection published by the State of Texas. CCBR also sought to document “substantial” rates of change, an accepted criterion for requesting adjustment, (TWDB, 2013). In this study, both historical (1990-2010) and event (depending on

data set: 2007-2013) periods were examined. A substantial rate of growth change over the past five “event” years when drilling ramped up means that, if projections based on alternative data illustrate a “bubble”, “curve”, range, or notable aberration from the general linear trajectory of the Texas State Data Center population projections, projections based on the alternative data should be considered. Even if end target populations, from both alternate and census based data, are in the same range, acceleration of change within a subset of the projection year span may warrant attention for planning and expenditure purposes. For example, a sudden acceleration of population may show that planning for a new well may need to be scheduled sooner, or funding structures may need adjustment to allow flexibility for infrastructure development or unanticipated local policy changes.

Following initial analysis of each data type, projections were calculated using a population multiplier and then compared to The Office of the State Demographer population projections. Ratios between the data types were calculated, as recommended by the State Demographer, to check for population profiles in line with the population multipliers used. Initial analysis provides a context from which to view each population characteristic, while comparisons of alternate data and State Demographer projection scenarios provide improved understandings. The study sought to document the population influx experienced by Region L. Ongoing analyses of data helped provide evidence for or against statistical support of significant and substantial differences, and thus, yield more reliable and valid inferences. It is important to note that this study is not positioned against currently published data by the State, but is presented as an aid to use in conjunction with State data and its ongoing development. This study sought to augment government efforts to gain more knowledge concerning the rapid growth and development patterns of this area outside of typical enumeration and formulation methods used by various government agencies. Documenting migration was important, but gaining a view of the process of migration was also important, so that various numerical profiles made sense. With more study at the state level, current changes will likely lead to revised B/D/M formula profiles for the area, leading to improved projection calculations for this areas by the Texas State Data Center.

It is important to note that since these calculations are based on mathematically manipulated numbers and each data source reflects a different characteristic of the population it represents, population numbers derived and projected from these data sources are not seamless. Likewise, numerical results are estimates only and not definitive “answers”. The methodology allows us to use data as a vantage point from which to view larger trends. However, interpretation is required in order to properly contextualize these viewpoints. Economic and social mechanics associated with the continued growth of the Eagle Ford Shale play and other developments will continue to be identified and ultimately alter the make-up of the region. Some of these mechanisms may appear threatening, while others may provide opportunities. In any circumstance, CCBR hopes this study provides some relief from the uncertainty associated with planning and resource management in the region.

As a statistical definition only, a projection that is used in a calculation is termed a “forecast”. While the term “forecast” connotes a predictive quality, there is no predictive capacity for the projection on its own (O’Neill, Balk, Brickman, and Ezra, 2001).² Although statistical “forecasting” methodology is used, the terminology for the resulting trajectories of population figures are labeled as “projections”, as the trajectories cannot be proven for the future. It is also important to note that there are variations between the quantities expressed in the base data and the range of resulting projections (USBC, 2012). No one

² O’Neill, B., Balk, D., Brickman, M., & Ezra, M., 2001, A guide to global population projections. *Demographic Research* 48 (8): 203–288, p 272: NOTE 2: “Often, the terms “projection” and “forecast” are used interchangeably. However, in some cases demographers differentiate between the terms based on the implied likelihood of the outcome. Projections are defined as the numerical consequences of an assumed set of future paths for fertility, mortality, and migration with no claim as to the likelihood of these consequences actually coming to pass. A forecast, on the other hand, is defined as the most likely projection (IUSSP 1982, Ahlburg and Land 1992), in the same way that a weather forecast describes the most likely outcome. Here, we use the term projection but attach no specific meaning to it. Instead, we specify the interpretations different agencies assign to their outputs.”

source of data captures the exact reality of changes in real time populations. They are based on past data that is mathematically manipulated by accepted methodology, such as general linear modeling (GLM), resulting in “best fit” models and nonparametric testing such as ranking.

Methodology

The main cause for recent economic growth in Region L has been related to extraction industry activities, which increased during the enumeration of the 2010 Census. This census followed the initial 2008 year of drilling and subsequent expansion of well sites and market opportunities that led to increases in employment for the petroleum and mining sector in the region³. It is important to understand how current population trends and data may not have been captured by the U.S. Bureau of the Census or the Office of the State Demographer research. Basic methods of tally used for census enumeration indicate that worker influx to Region L was not likely counted as part of the local population. However, this influx of labor is drawing from Region L resources, causing punctuated development in infrastructure. In fact, the demand on resources is felt in areas adjacent to the active EFS play. Housing, transportation, and services have been increasingly strained. Region L requires that this influx be accounted for on behalf of policy it must abide by. As a result, this study assessed alternate data and analysis from that used by the State of Texas; which help account for and measure these changes.

Petroleum and Mining Industry Development Effects on Population

As recommended by the State Demographer of Texas, localities that have experienced similar extraction industry based punctuations in population were researched for methodology and patterns that would inform this study. Other experts involved in researching the effects of population punctuations in petroleum and mining regions were interviewed (Potter, 2013; Colon-Lugo, 2013; Bangsund & Hodur, 2013). Following research related to the United States Shale plays, including the Marcellus in the Northeast and Haynesville in Texas/Louisiana, the population pressures of the Bakken Shale of North Dakota was identified as similar to what is occurring in Eagle Ford Shale. Methods to assess impacts and calculations for examining industrial NAICS code sector 21, Mining and Extraction, were adapted for this study from studies conducted by researchers at North Dakota State University’s Department of Agribusiness and Applied Economics and Center for Social Research (Bangsund & Hodur, 2012; Rathge, Danielson, Deal, Erickson, Lazarus, Olsen, Schwarzwalter & Wiertzema, 2012). Those studies projected that some permanent workers employed in non-sector 21 jobs gain employment in sector 21 jobs initially, and that overall job sectors stabilize over time. This can be seen from the two sample slides below.

³ Baum, C. 2012. Politically Incorrect Gas Is Jobs Machine. <http://www.bloomberg.com/news/2012-03-14/oil-and-gas-boom-interrupts-greening-of-america-caroline-baum.html>: “Every direct job created in the oil-and-gas extraction industry, for example, yields 2.3 jobs elsewhere in the economy, Franklin says. This is expressed as a multiplier of 3.3, higher than the average of 2 for the 195 industries tracked by the BLS. Petroleum-and-coal product manufacturing (refineries) happens to have the highest multiplier at 8.2”

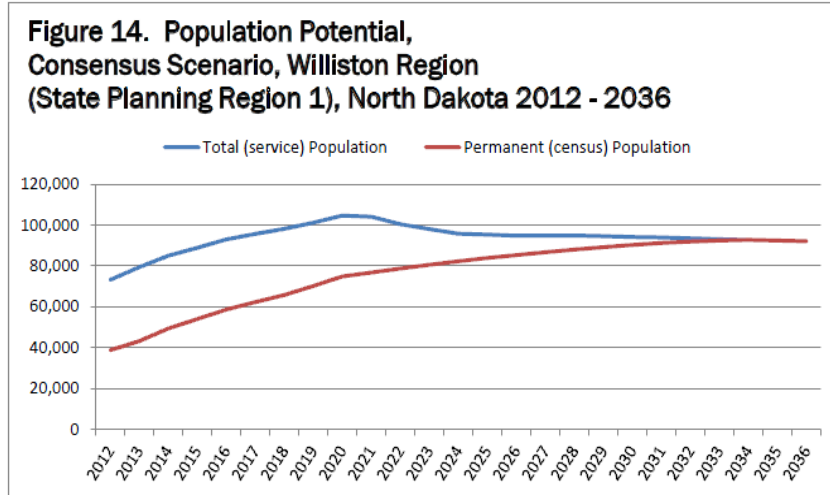


Figure 2: Projections of Future Employment and Population - North Dakota Summary Agribusiness and applied economic report 704; source: Bangsund & Hodur, 2013 - Williston Basin 2012, <http://ageconsearch.umn.edu/bitstream/142589/2/AAE704%20web%20.pdf>

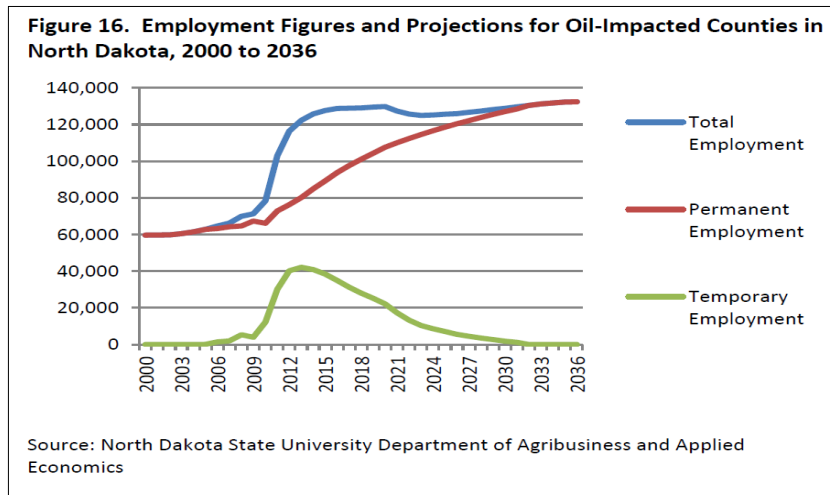


Figure 3: 2012 North Dakota Statewide Housing Needs Assessment: Housing Forecast, p.127; source: Rathge, Danielson, Deal, Erickson, Lazarus, Olsen, Schwarzwalter, & Wiertzema, 2012, <http://www.ndhfa.org>

“The literature indicated that the population in most natural resource-dependent communities increased or stabilized during the “boom” phase, reached a plateau as the natural resource industry matured, decreased during the “bust” phase, and remained in a trough between the “boom” and “bust” phases. Population change was directly related to other community concerns such as housing, school enrollments, and demands for services.” (Putz, Finken & Goreham, 2011)

Discussion on State Data Methods and Usage

The State Demographer projections used in this study were those posted on the TSDC website when this study began; they projected out to 2050 from 2010 (TSDC, 2012, 2013). In relation to the discussion about the past and future 10 year periods, as well as the forward looking 40 year projections, TWDB works under an outlook that goes to 2060. The latest figures released went out to 2070 (see: Appendix, TWDB). The method used to project 2070 values from the published 2050 values was “by using the trend of the average annual growth rates of the 2011-2050 TSDC projections” (see: Appendix, TWDB; TWDB, 2013). Again, the numbers several decades out are based on the values obtained through the methods and assumptions discussed and may not reflect actual numbers, changes or more importantly, *change rates* occurring in Region L.

Before examining the alternative data and analysis, it is important to understand how standard methodology used by the Office of the State Demographer may not reflect the punctuated economic activity and population trends associated with development in the Eagle Ford Shale. Assessing the basic data, methods, assumptions and calculations used will form a foundation to support the case for alternative choices for information that can be provided to the State of Texas concerning Region L demographic data.

Methodology used for the State Demographer’s population projections is discussed below, followed by information regarding the methodology used for this study. Issues discussed below concerning State of Texas projections include enumeration, methods and formulas, and situations:

- Enumeration– (1) missing impacts, such as large employment spikes (2) missing people, not counted or identified
- “Change” calculations– differences over time in cultural population profiles that relates to B/D/M patterns, due to in-migration from multi-state (and possible international) origination
- Instability of formula profile– inappropriate application of generalized State population profiles to specific Local high change areas
- Time perio– missing punctuation aspects that do not show up in standard projection trend-lines, such as the “bubble effect”
- Meaningful outliers smoothed– actual imbalance from profile norms is erased as part of the methodology
- Outlier substitution– data from profile norms is substituted for actual data, erasing meaningful data
- Population “persons per household” (PHH) number variations– ranges are extreme; government data sources conflict
- Time period to population calculation impracticalities– realistic circumstances or physical limitations (examples Hays and Karnes) do not match proposed projections and cannot be realistically supported; “bubble effect” is not reflected over time
- Lack of macro-economic pressures events– projections do not reflect external variation
- Special populations– “institutional” definitions lack reflection of modern characteristics and behaviors
- “Cohort-based methods” such as the B/D/M formula (explained below) – may not be the best

Issues with Assumptions related to U.S. Census data and the State Demographer Population Projections

The first assumption issue concerns use of the U.S. Bureau of the Census figures: that in the population enumeration of 2010 all population was counted. Extraction industry activities in Eagle Ford Shale (EFS) play of Region L began in 2008, but did not accelerate until 2010-2011. Thus, as change was underway, the enumeration process was based on pre-boom circumstances. Added to this is the standard practice of the Census Bureau not to count any residents occupying temporary housing, such as that used by extraction industry workers in the EFS play, despite their significant numbers (Bangsund & Hodur, 2013). Research conducted in the Bakken Shale play of North Dakota, illustrates this:

“Drilling and fracking, infrastructure construction, and gathering system construction largely consist of a temporary workforce. These workers are often residents of other states and work in a location until the job is complete and then move on to the next job site. Temporary workforce also includes shift workers with alternating patterns of working and non-working periods. Even though workers may be onsite or in the state for an extended period, they are viewed as a temporary resident relative to the lifecycle of oil field development and are not considered established residents of the state in which they work. The permanent workforce is comprised of individuals who work in the [area] and are established permanent residents. . . . Temporary population includes individuals not counted by the U.S. Census Bureau who claim residency in other states, work for short durations in the region, do not have permanent addresses in the region or are otherwise associated with short-term employment (relative to the life-span of the oil fields)” (Bangsund & Hodur, 2012, p4).

As demonstrated by Rayer and Smith (2010), “population rates for the base rate period have a substantial impact on forecasting accuracy”, therefore initial enumeration is very important⁴. This study estimates that there were a large number of workers who were not counted in the 2010 census, but resided in area camps, hotels, rentals and RV parks. Therefore, the figures on which the Office of the State Demographer population projections are based do not reflect the entire population, either in the 2010 Census or in survey-sample-based updates since 2010 (USBC, 2012)⁵.

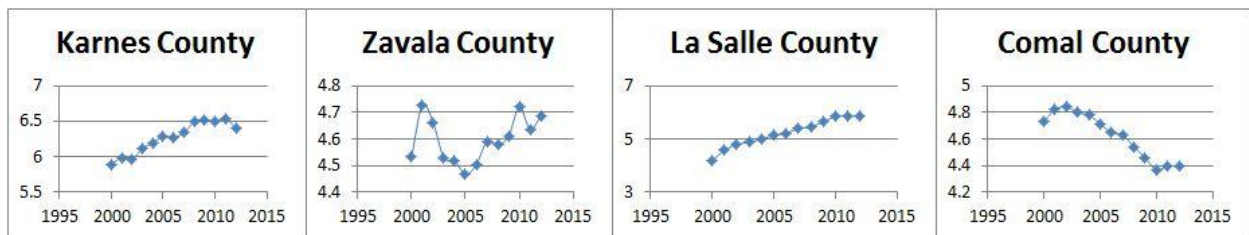
For the periodic population projections “based on the 2010 Census- for 2012 through 2060 . . . The assumptions for the components of change are based on time series analysis of historical trends” (USBC, 2012). However, in Region L we see a punctuation on the historical trend that should be recognized.

Population projections issued by the Office of the State Demographer are based on standard B/D/M calculations for rates of change for rates of fertility (birth), mortality (death), and people entering or leaving an area (in-/out- migration). Population projections for this study used person per household multipliers related to a particular population subset or cohort characteristic. Person-per-household (PHH) reflects a typical household size for any one person in the workforce, enrolled in school (SE) or per

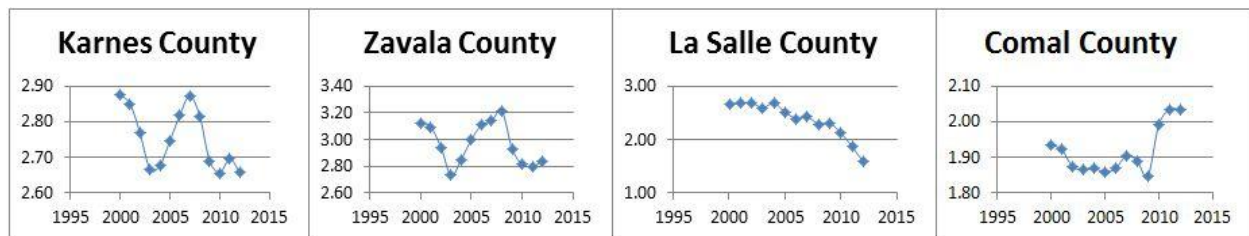
⁴ Braschler, Croll, Phifer & Kuehn, 1993: A study on community growth out of Missouri found that “impacts are not instantaneous; research indicates it may take at least four years for all non-basic impacts to occur.” External economic variables are “basic”, local economic variable are “non-basic” (<http://extension.missouri.edu/p/DM3006> Economic base multipliers and community growth)

⁵ USBC, 2012 :“Each year, the U.S. Census Bureau produces and publishes estimates of the population for each state and county, as well as the nation as a whole. We utilize administrative data from a number of sources to estimate 1) the change in population since the most recent decennial census, and 2) the population for each year since the most recent decennial census. With each annual release of population estimates, the entire time series of estimates beginning on April 1, 2010 is revised and updated. . . For the nation, we release monthly estimates of the resident population by age, sex, race, and Hispanic origin. . . For each state and county, we release annual estimates of the resident population by age, sex, race, and Hispanic origin.” (2012 Methodology for the United States Resident Population Estimates by Age, Sex, Race, and Hispanic Origin and the State and County Total Resident Population Estimates (Vintage 2012): April 1, 2010 to July 1, 2012, 33 natsco census.gov/popest/methodology/2012-nat-st-co-meth.pdf).

housing unit (HU). In order to use alternative data, a PHH multiplier on cohort characteristics suggested by the U.S. Bureau of the Census and Office of the State Demographer was 2.58 for a national average, and 2.75 for a Texas average. However, according to research, many localized areas in Texas are approaching a multiplier of 3 or more, with some cities calculating a multiplier effect as high as 6 (USBC, 2011; Dallas Bar Association, 2012; usa.com, 2012, 2013). Based on historic trends that indicate high rates of in-/out- migration due to disasters during the 2000-2010 period (9/11, hurricanes, drought, housing crisis, and recession), it is likely that standard multipliers suggested for Region L and census calculations for rates of change under-report not only current rates of change since 2010, but the rate of change leading up to 2010. Impacts of documented accelerated change for migration rates to and from EFS, as well as calculations of cohort characteristics on historical population data show a wide variation in derived multipliers. Where employees without accompanying families show a large influx, the derived multipliers for PHH becomes diluted. A selection of PHH multiplier graphs is shown below, illustrating various ranges:



Graph 1: Multiplier graphs for Karnes, Zavala, La Salle and Comal based on School Enrollment



Graph 2: Multiplier graphs for Karnes, Zavala, La Salle and Comal based on Employment

Hence, this study examines the assumptions and methodology stated in methodology documentation provided by the Office of the State Demographer population projections (TSDC, 2012);

“These projections should be used only with full awareness of the inherent limitations of population projections in general and with particular and detailed knowledge of the procedures and assumptions delineated below which characterize the projections presented in this report.” (p2, 3)

“Projection Methodology

The projections were completed using a cohort-component projection technique. As the name implies, the basic characteristics of this technique are the use of separate cohorts-persons with one or more common characteristic- and the separate projection of each of the major components of population change- fertility, mortality and migration- for each of the cohorts. These projections of components for each cohort are then combined in the familiar demographic bookkeeping equation as follows:

$$P_{t_2} = P_{t_1} + B_{t_1-t_2} - D_{t_1-t_2} + M_{t_1-t_2}$$

Where:

P_{t_2} = the population projected at some future date $t_1 - t_2$ years hence

P_{t_1} = the population at the base year t_1

$B_{t_1-t_2}$ = the number of births that occur during the interval $t_1 - t_2$

$D_{t_1-t_2}$ = the number of deaths that occur during the interval $t_1 - t_2$

$M_{t_1-t_2}$ = the amount of net migration that takes place during the interval $t_1 - t_2$

When several cohorts are used, P_{t_2} may be seen as:

$$P_{t_2} = \sum_{i=1}^n P_{c_i t_2}$$

Where: P_{t_2} is as in the equation above

$P_{c_i t_2}$ = population of a given cohort at time t_2 and

$$P_{c_i t_2} = P_{c_i t_1} + B_{c_i t_1-t_2} - D_{c_i t_1-t_2} + M_{c_i t_1-t_2}$$

Where: all terms are as noted above but are specific to given cohorts c_i

In this, as in any other use of the cohort-component technique at least four major steps must be completed:

1. The selection of a baseline set of cohorts for the projection area or areas of interest for the baseline time period (usually the last census and for other dates for which detailed base data are available);
2. The determination of appropriate baseline migration, mortality, and fertility measures for each cohort for the baseline time period;
3. The determination of a method for projecting trends in fertility, mortality and migration rates over the projection period;
4. The selection of a computational procedure for applying the rates to the baseline cohort to project the population for the projection period.” [Emphasis added] (TSDC, 2012)

Although this study, when using alternative data sets based off of cohort characteristics, employment, housing units and school enrollment, did not use the fertility/mortality/migration components, the

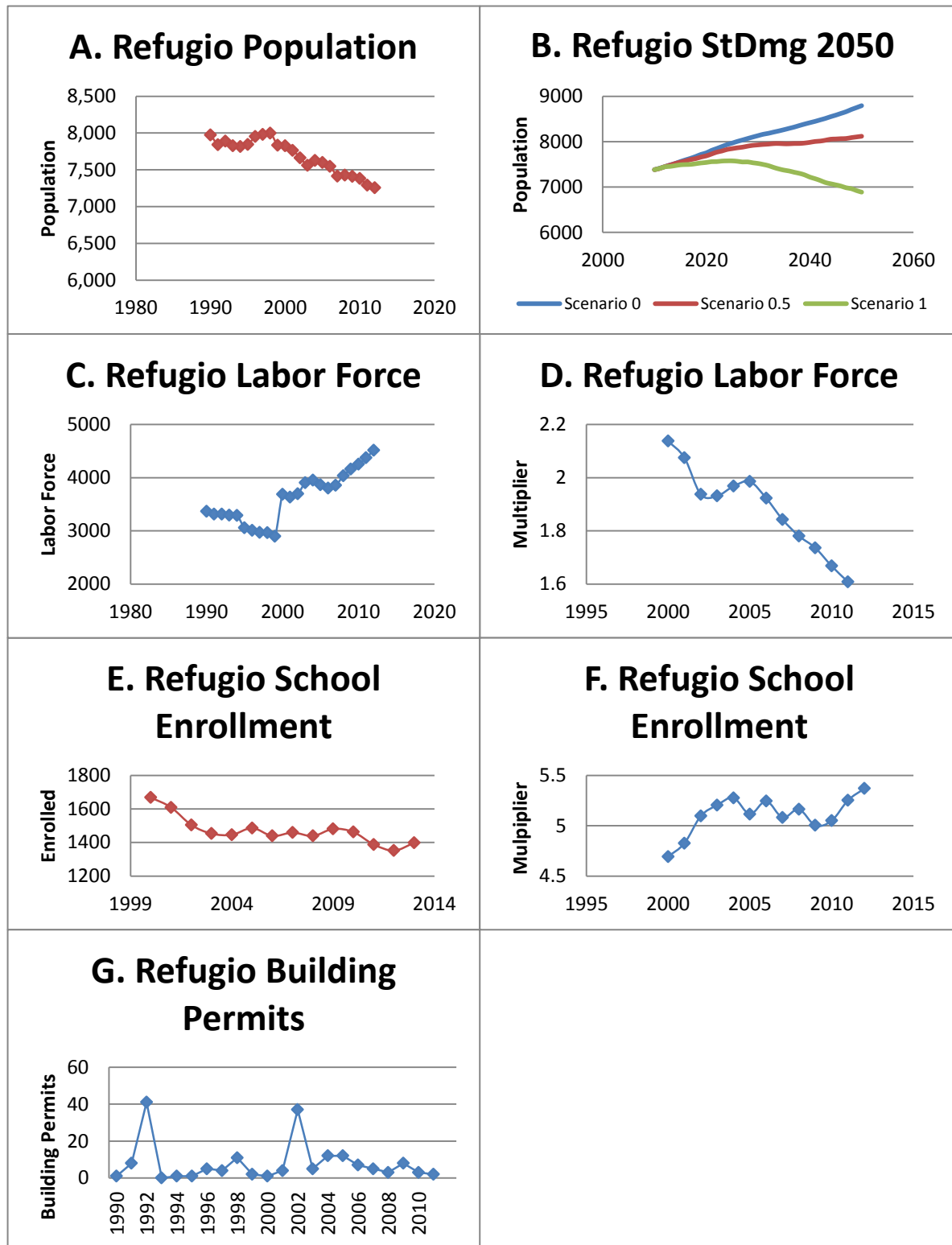
research here still adhered to the four steps listed. A baseline was used against which other data and from which projections could be compared and run; a baseline of the alternative data set was determined; a method for projection was determined; and computational procedures were followed concerning baseline and projection application. In addition, explanation of processes and results with objective analysis and inference across results has been included, as per the above recommendations.

Another issue concerning the standard methodology, in the face of punctuated change being experienced by Region L is the impact of macroeconomic pressures, missing in the standardized B/D/M method. Examining Region L data, interesting patterns locally - or lack thereof across the region, can be discerned. Examination of data relative to economic pressures allows inferences about processes behind population changes. During periods of recession, political, and weather related crisis, behavior patterns may become altered and reflected in population. Possible behavior changes could include delaying marriage or delaying having children, experiencing high levels of debt, job and housing loss, changes in sales tax or other tax bases⁶, companies being downsized, going through expansion, or altering investment⁷, and internationals coming into this country for opportunity and security. These types of uncertainty can disrupt otherwise normal smoothing of cohort characteristics data.

An example of the inability of the population projections to reflect macroeconomic pressures is the trends shown in the figures below for Refugio. A depressed economy and high rates of out-migration would show a downward trend of population over the next 40 years. Whereas the normal and conservative population projections show a general decrease for Refugio, the aggressive population projection shows an actual loss for a population lower in 2050 than for the present. This is due to the trend of downward pressure being magnified in that formulation. On the other hand, employment for Refugio shows a steady upward trend; in areas with job opportunities, it is unlikely that the county would continue to see a decline in population. This population may in turn reflect more single or childless persons as seen in conjunction with the graph for declining school enrollment, which would confirm anecdotal information about the influx of family-less EFS workers. These workers may be uncounted due to lack of housing, to commuting between nearby counties, or to finding employment fortune after a recession-drought of jobs. The graphs below show total labor force, which includes unemployed and employed. Refugio saw spikes in building permits in 1992 and 2002, but a fall off after the 2006 recession; housing market studies would be recommended to understand more about the population patterns.

⁶ CCBREFS, 2012

⁷ CCBREFS 2012, 2013

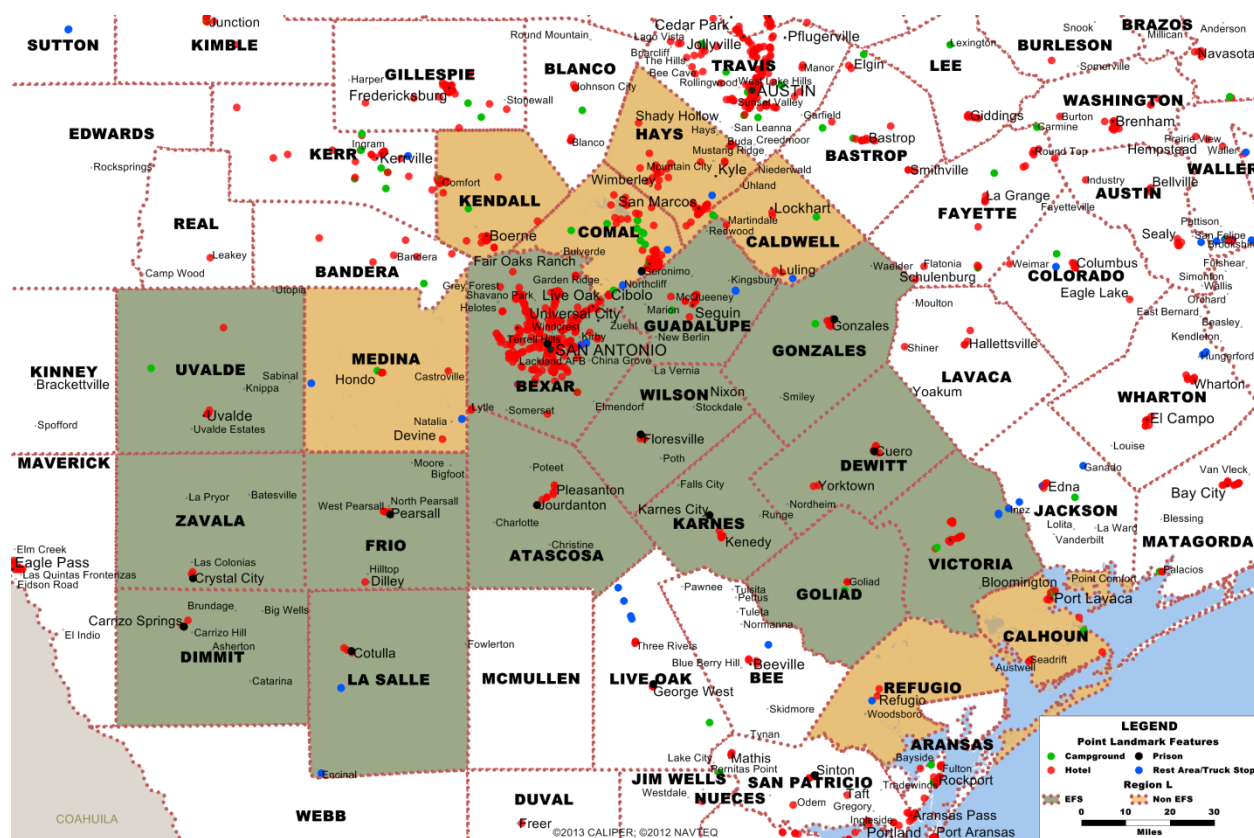


Graph 3: Refugio County: A. Historical Population; B. State Demographer Population Projections; C. Labor Force; D. LF Multiplier; E. School Enrollment; F. SE Multiplier; G. Building Permits; source: CCBR

Another issue is that, according to standard census-based methodology, special populations may be removed from base population calculations.

“... following standard practice, special populations were removed from the base population only when they made up five percent or more of the population of the area.” (TSDC, 2012)

“Special” populations consist of those who are considered actively out of the generation and attrition related population behaviors; they are set apart due to circumstances that, theoretically, keep them from engaging in normal rates of fertility. Those populations include higher education students, prison inmates, and military personnel. Of course, the assumption that college students and military do not engage in standard fertility and mortality behaviors can be argued against, as today, a high proportion of students are not children who have left home for the cloistered environment of university care, but adults with families and careers. Likewise, it is common for modern US military personnel to have families and not be reflective of an all single, male population living in barracks demographic; in times of war, such as now, military personnel also are deployed for special situations to unique locations for various periods of time. These populations are excluded from some change calculations in state data, and then added as a stationary number (not used with a multiplier, for example) after calculations have been made. This again, in a region that has a large military presence with probability of that population reflecting families, adds doubt to the actual counts of population being reflected by the state numbers. This may not be cogent to the study at hand, as special populations are not within the range of workforce influx considered undercounted in this study. However, it is related to the discussion of standard versus event related methodologies and may be associated with differences in population numbers at the county level between TSDC population estimates and alternative population values.



Map 2: Map of Special Population Locations, Source: CCBR GIS

Background discussion about population transition theory and application

Populations experience transitions over time, periods that can last years or for several decades. “Transition” is a demographic term that refers to the change over time of a population from one state or level to another across five identifiable phases; a total population transition time period, across all five phases, may last 75-400 years (Chesnais, 1983, 1990).

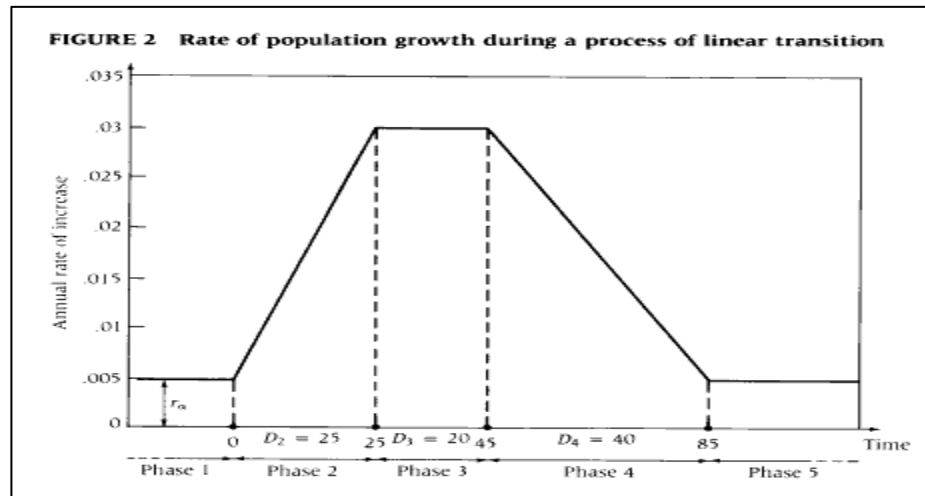


Figure 4: Rate of Population Growth during a Process of Linear Transition”; source: Chesnais, 1990, p.329

Phases include pre-transition, in which there has been a leveling out of population numbers going into the transition, a growth phase, a stagnation phase, a decline phase, and a post-transition phase. Note that across these phases, population growth rate is at different levels. The length of phases reflects the fact that as an individual’s age increases, they move from one type of population or “cohort” to another; from child to child-bearing, from fertile to non-fertile, and from living to non-living. Thus, at any given time, the population count is shifting and the makeup of cohorts is changing. For example, a common family size, or the prevalence of health-based threats to longevity may vary across populations in different countries, but be fairly stable in localities. In order to estimate a total, the current actual population is sectored into groups that have both duration of viability and an impact on other groups (for example, child-bearing on those being born). In addition, racial or cultural backgrounds may affect rate-norms of child mortality, fertility age spans, and longevity, allowing for cohorts based off of these social groups to be assessed as well. Although not used in this study, income levels may be utilized as variables in “cohort component” methods. From the population projection methodology documentation:

“As the name implies, the basic characteristics of this technique are the use of separate cohorts--persons with one or more common characteristic--and the separate projection of each of the major components of population change--fertility, mortality and migration--for each of the cohorts. These projections of components for each cohort are then combined in the familiar demographic bookkeeping equation. . .”(TSDC, 2012, p2)

From Chesnais’ perspective, the 40-year projections published by the Office of the State Demographer are brief. The Texas State Data Center uses figures sourced from the 2010 U.S. Census as a base from which a formula that uses birth, death, and in-/out- migration rates is applied in order to build a population trend over time. However, “arguments have been advanced that simple extrapolation and more sophisticated aggregate time series methods still have much to offer population projection methodology (Lee et al., 1995, Pflaumer, 1992). Such methods may in fact be more accurate than the cohort-component method spread over short time horizons i.e., up to a few decades (Pflaumer, 1992; Rogers, 1995). . . “

(O'Neill, et al., 2001, p213). Population phases illustrate the stabilization over time of population rate changes across the phase-change periods. Using a method that assumes the period has stabilized would lead to unreliable results if, in actuality, the projection should be understood as focused within one of the non-stable phases. So, rate of change may undermine results. Also, a standard method that assumes a long period of time being used for measuring a different shorter length of time may not have accurate results. The transition phases as a set allow equilibrium to develop across the disequilibrium of the various transition phases. Mixing equations meant for different rates and time periods may result in non-realistic ending values; results would show a confusing and contradictory set of projections, not stable trends. Some projections, although mathematically correct would be unreasonable, such as the projection that shows Hays county increasing its population fivefold or the ones that show Dimmit and Goliad turning into population ghost counties. What is actually occurring now in Region L population rate change – rapid transition in a short period of time– may be seen as one of the five rate-change phases, not as standard to the set of phases as a whole. However, formula used in the State Demographer projections has assumed a stabilized norm, such as the pre-transition or post-transition phase. When examining the range of values calculated, some projections therefore may overstate projection trend causing ending values to demonstrate extreme loss or gain, but not based on a growth or decline formula. Instead, what may need to be assumed is a growth or decline phase- part of an overall process, not the result of the whole process itself. In Region L there is anecdotal evidence. This study found some statistical evidence that B/D/M formulas used may not reflect the shorter, more punctuated change phase as they are designed to reflect a longer transition period, assessing stability. Relative to the ranges of projection: “the pace of the increase in the spread between high and low should decrease over time” (Hollmann, Mulder& Kallan, 2000). However, this is not what we see in the three projections across Region L.

Examples of State projections that illustrate an increase of spread are Hays County and Karnes County. The growth trajectory for Hays shows almost one million in population for the aggressive scenario, five times the current population, while Karnes’ loss trajectory shows a large decline- despite the fact that it is in a very active extraction area.

Yet another issue in the State Demographer methodology concerns the treatment of outliers. One statistically abnormal cohort has the potential to influence the data in one direction or another even considering the long periods of time included in phases of population transition. In order to understand the trend of population over long periods, smoothing techniques are used in order to achieve a better fit to a mean or line. An abnormal figure from one year or cohort, referred to as an outlier, can cause a wide variation in the trajectory of a projection or calculation, or can pull the slope of the trend line up or down. Multiple outliers can render a projection’s underlying data not only unreliable, but possibly invalid. Therefore, assumptions are required in order for the end product to not be unjustifiably skewed or unreliable, especially if an abnormal figure represents one of the population types expressed in a cohort. In the current study, the use of demographic science standards and smoothing methods may contribute to reported projections for the subgroups of the Region L population to differ from what some Region L representatives are experiencing anecdotally. An example is the existence of “bubbles” in historic data where a jump in employment numbers is far out of range of normal data trends. In the first figure below for Dimmit, the “bubble” of employment is important data but is seen by the statistical software as an outlier; the trend line works of previous data points and ignores the bubble. The total employment for 2050 is between 6,000-7,000. In the second figure for Dimmit, based on the event employment, the software sees the data as part of a trend, not an outlier. Over the 40 year period of the forecast, employment is seen at around 30,000. In relation to another west Texas county with a history of petroleum activity, Tom Green county, population of about 110,000, 30,000 for Dimmit over 40 years seems like a more reasonable number if extraction activities and investment follow trends seen in other Sector 21 areas of the state.

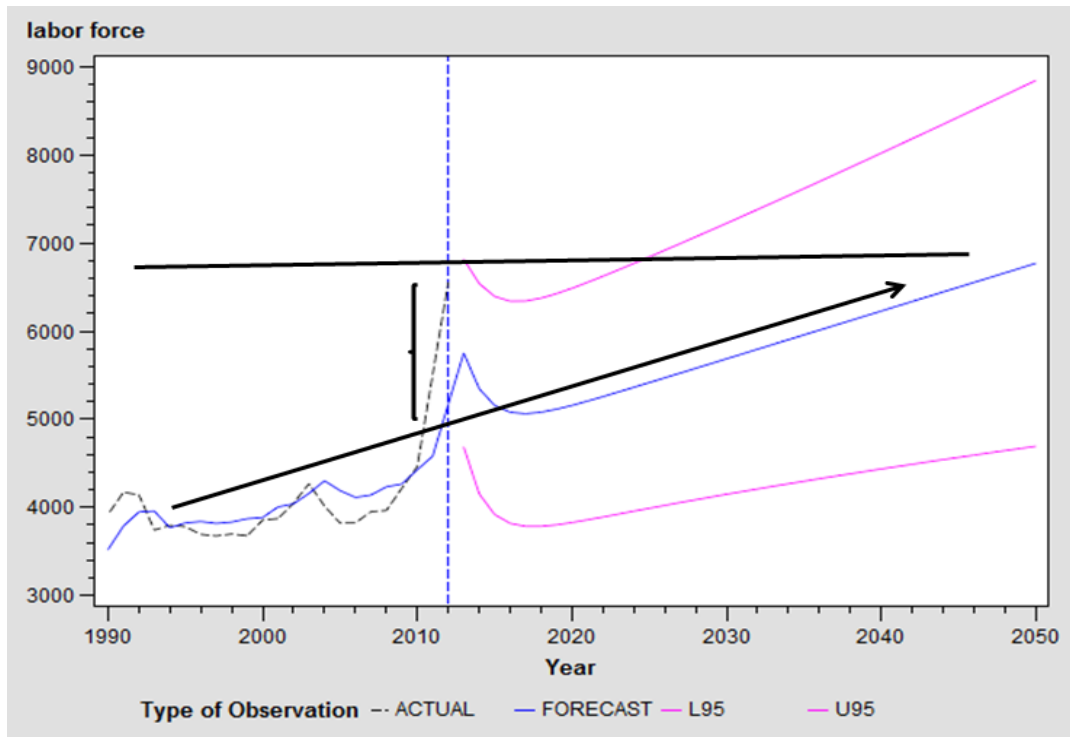


Figure 5: Historic Employment Forecast for Dimmit County; source: CCBR

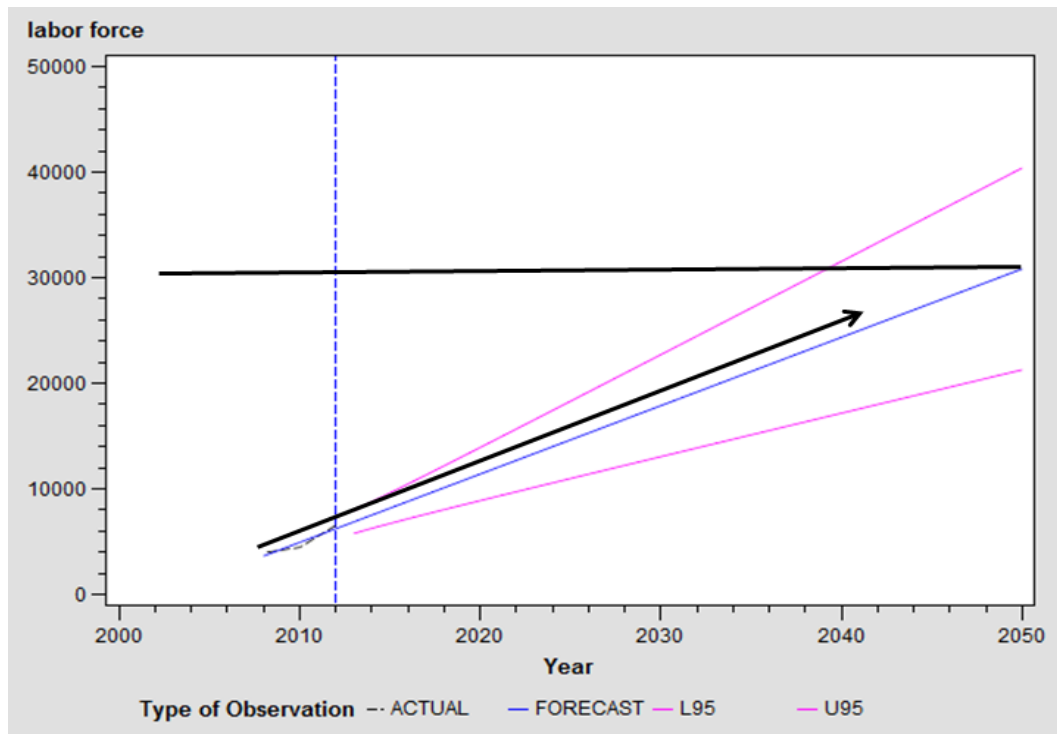


Figure 6: Event Employment for Dimmit County; source: CCBR

Yet another issue concerning the State population projections is enumeration from which the projections were based. In the 2010 Census, many EFS workers were deemed transient, meaning that if they were counted at all, they were counted in terms of their home in another county or state. Additionally, in light

of general long-term phase-based and smoothing methods, the cohort profiles for child-bearing, fertility, mortality and migration may be different for these workers; the formulas may be impacted by legitimate EFS-related outliers as seen in the example above. .

Additionally, a smoothing method issue is of concern. This study has discovered that a standard smoothing method used by the U.S. Census Bureau may have affected projections and possibly individuals who were counted in the census. In other words, some Texas and Region L citizens may have been counted during the census, and not “shown up” in census-based projections due to the smoothing methodology used to calculate projections over long periods of time. This issue rests on the assumption of matching appropriate statistical tools to a population transition time period. It is important to understand that this is not an “error”, but rather an accepted method to normalize the calculations that reflect long periods wherein population transitions occur. The methodology used is not intended to identify aberrations in population development during short time periods, but to smooth aberrations for the sake of computational normality over a long period of time. It is reasonable to expect that better and more accurate results would be found if generalized smoothing of aberrations was not done for localized areas.

This study hypothesizes that alternative methods of smoothing can support a case for alternative population projection differences over a short term or in a representative region and that such differences would be different from overall long term populations projected by the state that assume local populations reflect a national or statewide profile norm.

Smoothing and long-term methods are used, as discussed above, in order to keep aberrations from skewing long term projections, and for descriptively generalizing population growth or decline patterns over a long period of time. These projections should not be pulled out of context by an odd event or statistic. Such long term analysis demonstrates patterns of aging, health, economic development, and other socially viable circumstances. But in a local context, that method may have led to miscalculation, since the population creating an unexpected impact on growth in the region is smoothed. The punctuated insertion of population influx is not predicted by normal projection methodology, and is in fact smoothed out, so it will not show up. This is important, as the need for an examination and codification of short term, unexpected patterns is realized. The long-term smoothing method is described as follows, taken from the methodology documentation for the 2010-2050 state Demographer’s projections developed by Dr. Hoque, former State Demographer of Texas,

“ . . . for some counties the migration rates were problematic in yet another manner. The use of historical rates often resulted in substantially higher rates of net migration for one sex than the other. Such an imbalance cannot be expected to continue over the entire projection period. The ratio of male rates relative to female rates for each age was examined by computing means for each ratio and analyzing standard deviations for such means. From this analysis, it was decided that a ratio greater than 2 should result in a replacement of the migration rate. Given this, rates were adjusted to be no larger than twice the ratio of male to female rates or visa versa at the COG and State levels within county types for the same age, sex, and race/ethnicity group (i.e., metropolitan central city, metropolitan suburban, nonmetropolitan adjacent, and nonmetropolitan nonadjacent). If the ratio of male to female migration rates for a county of a given type for any age exceeded this limit for the COG⁸ type, its rate for that age, sex, and

8 <http://www.txregionalcouncil.org/> : COG is Council of Government, a regional consortium of governments; In Texas, county governments may be represented by a COG, such as Alamo Area, Alamo State Planning Region (18), <http://www.txregionalcouncil.org/display.php?page=region.php&COG=AACOG>; Middle Rio Grande Development Council (24), <http://www.txregionalcouncil.org/display.php?page=region.php&COG=MRGDC>; Capital Area Council of Governments (12), <http://www.txregionalcouncil.org/display.php?page=region.php&COG=CAPCOG>; Coastal Bend Council of Governments (20), <http://www.txregionalcouncil.org/display.php?page=region.php&COG=CBCOG>; Golden Crescent Regional Planning Commission (17)

race/ethnicity was replaced with that for the county type for the COG. If the COG's rate for the county type was still problematic, the rate for that county type for the State as a whole was substituted for the county rate.” [Emphasis added] (TSDC, 2012)

This stipulates that if an imbalance in the demographic characteristics of a particular area is noted, those “imbalanced” numbers are changed based on non-local or state averages. If that is still not suitable in bringing the figures into the range of the norms, cross-state norms for that county type will be used. Not only does this replace actual numerical values with a substitute, but it also does not reflect the B/D/M formula patterns a particular cohort causing the change may exhibit. For example, single workers or workers without families living in camps and hotels would not be participating in “normal” fertility rates, and we would expect to see a dilution of PHH rates for the EFS area, a result the study found evidence for correct. Given that Region L has many counties that fall into one of the types of “problem” county types—that of rural and high male counts (due to punctuated workforce influx), this study offers that actual counts should be used for assessing the short term and long term projected population count, not smoothed or substituted figures. Smoothed numbers were used in the State population projections; hence, documentation of alternate data that reflects non-smoothed numerical values is offered by this study.

This study looked at the possibility that the “problematic” population members were the influx of great numbers of single males working in the economic punctuation area in Region L. Those that did show up as counted by the census were smoothed away due to the nature of the overall purpose and methodological assumption of the population projection. However, they should be counted in relation to the punctuated events affecting the area, policy, and infrastructure. The rates of influx is likely to change “norms” in this area, and as such, can warrant the evidence of “substantial rate change” required for an adjustment to population numbers used by Region L planning (TWDB, 2012).

An issue about population multipliers exists. A population multiplier is a number related to a population characteristic that is used to multiply that characteristic-based data value in order to project the population that characteristic represents (Chesnaï, 1990). It is a statistic used for general estimation, substituting for actual counts. Demographic profiles affect norms for household size and changes to household size: “(O)lder and residentially stable” populations have a “dampening effect” in rural areas over time, while and some characteristics such as ethnic influences or aspects of human capital, under normal circumstances, have been shown to have little effect on rural population change (Deller & Schreiber, 2012). Because characteristic-based data only reflects the portion of the population that can be counted using that data, a multiplier must be applied to estimate how many people that particular characteristic represents. There are two aspects to what can be estimated: persons per household (PHH), also called household size (HH), and family size.⁹ The recommended PHH multiplier allows variation in family size ranges to be spread across the population representative in the unique data type. PHH can change over time, for example, overall HH changed from 4.67 in 1970 to 3.53 in 2000, with school aged children values changing from 1.92 in 1970 to 1.01 in 2000. The current U.S. Census (2010) national PHH multiplier is 2.58 while the current PHH multiplier for Texas is 2.75 (USCB, 2010; Listokin & Burchell,

⁹ Source: U.S. Census Bureau, 2011 American Community Survey (ACS).

HOUSEHOLD AND FAMILY SIZE⁵		
Total Native-Born Population	21,473,006	
Average household size	2.65	--
Average family size	3.25	--
Total Foreign-Born Population	4,201,675	
Average household size	3.64	--
Average family size	4.09	

2006,). Some Region L Counties are shown by census data to maintain a higher PHH rate than the 2.75 listed for the State of Texas. These specific numbers are addressed in the data sections of this report. In a March 2013 press release, the U.S. Census acknowledged Texas as maintaining one of the highest rates of positive population change in the nation (USBC, 2013).

Former State Demographer of Texas, Steve Murdock noted in a 2010 presentation on changing ethnic profiles in the state that “Texas has lots of growth, but growth is not everywhere.” Below is the map he used to illustrate this point (Dallas Bar Association, 2012). Two updated maps follow, illustrating historic change and the changes from 2008-2012, during the EFS event period. This illustrates the reversal of out-migration in several of the Region L counties, and an influx of population to the Region L area.

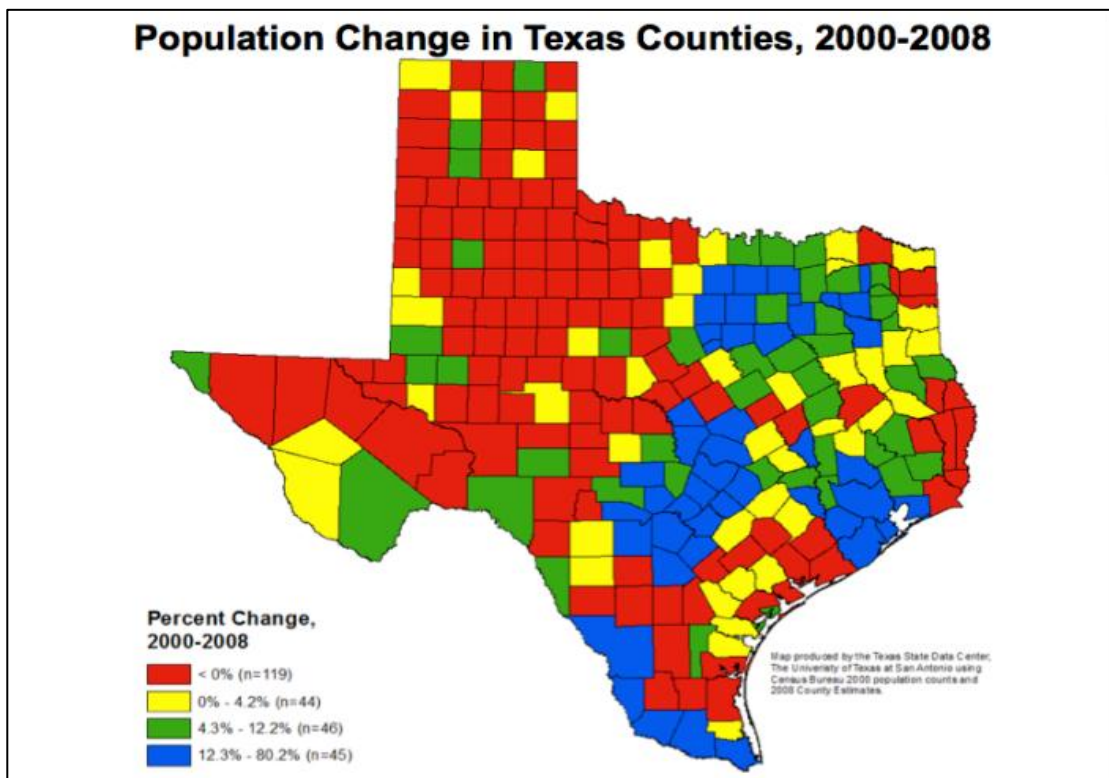
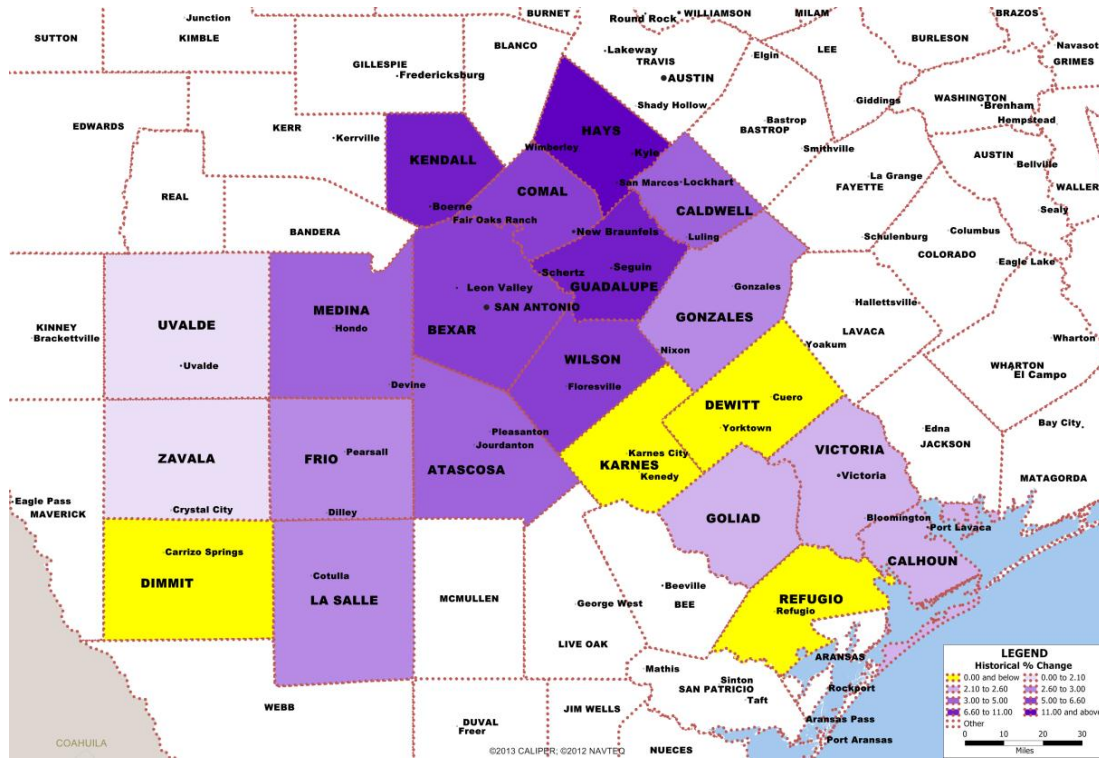
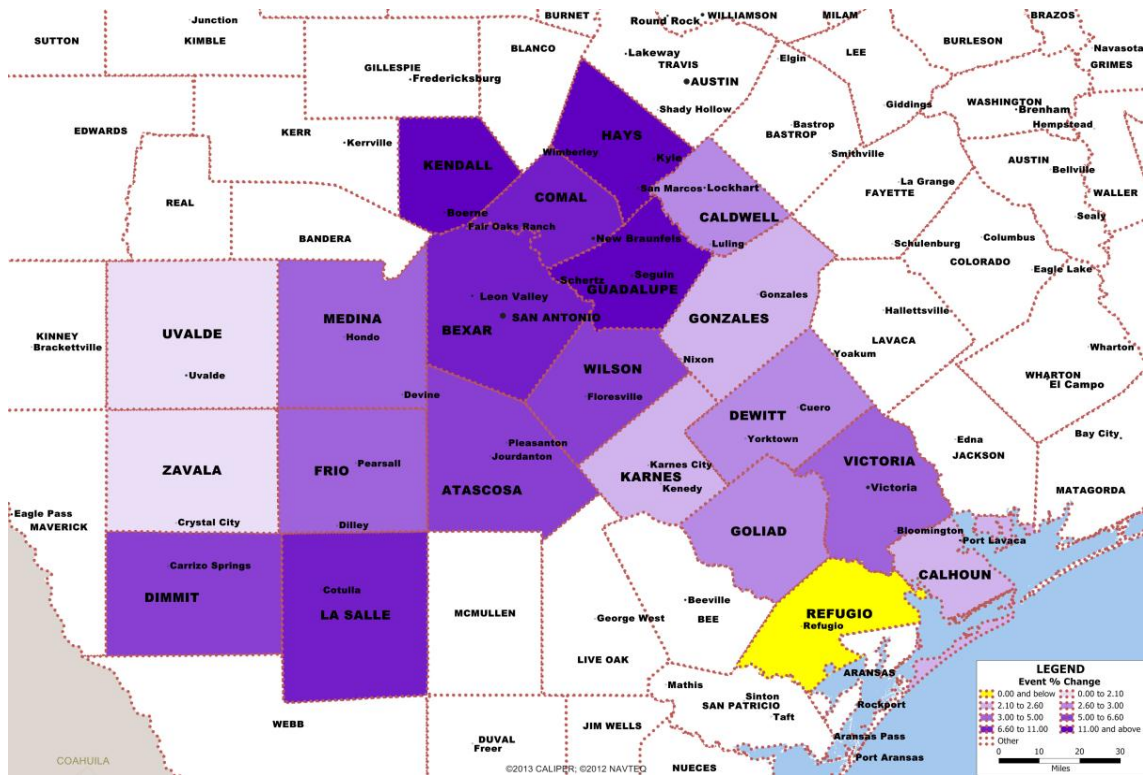


Figure 7: Murdock Map of Texas Population Change 2000-2008; source: <http://www.texastribune.org/2010/03/11/former-census-director-talks-demographic-shift/>



Map 3: Map of Region L Population Change 2000-2008; source: CCBR GIS



Map 4: Map of Region L Population Change 2008-2012; source: CCBR GIS

Listokin and Burchell (2006) stress that “current data is essential.” In a study for the U.S. Bureau of the Census, researchers at Rutgers University noted that confidence intervals for PHH calculations ran in the 90% range, and that generally lower home values represented higher PHH values (Burchell, et al., 2006). It is important to understand how changes to the economy have affected Region L Counties’ PHH. “Population multipliers will require downward adjustment in areas having large pools of unemployed or underemployed residents” and researchers “may need to modify standards to fit local conditions” as population shape can be effected by changes in boom and bust cycles (Burchell, et al., 2006; Putz, et al., 2011). In addition, a study published by the Pew Research Center noted that “unauthorized” or undocumented immigration can comprise a significant portion of population in-migration. The average calculated for the period of time, 1820-2006, was 4.4 per 1000 US residents, with a 5.4 average since 1980 (Passel & Cohn, 2008). The proximity of Region L to the United States-Mexico Border suggests the probability that an increase in EFS activity may be attracting more than just American citizens to the area for residence and employment. Fear of deportation is known to lessen the desire of undocumented workers and families to take part in official enumerations, though some children of undocumented families may be counted in public school tallies.

In addition, housing unit size and valuations have been tied to PPH variations (Burchell, et al., 2006). This is important as housing has been at a premium in the EFS area with pressures of high cost and high demand. PHH may be affected by families and workers doubling up as well as workers leaving families at an out-of region home. PHH may also be associated with cultural profiles.¹⁰ For example, if we assume that for every working person, or for every public school attendee, or for every housing unit, there is more than one person, then we use the multiplier with the cohort characteristic count to arrive at a population represented by that cohort. For 10 U.S. workers, we would calculate a population of $2.58 * 10$ or 25.8, for Texas 27.5, and for local high in-migration, 3.0+. Resulting is a 14% difference between U.S. and local estimates. The multiplier provides us with a “household size” that the cohort member represents. Of course, not every household is the same size, but statistically, an average multiplier can provide reasonable estimates of population. The table below shows a list of multipliers published by an online reference, to illustrate the range that some sources use.

PHH multipliers in this study were calculated from historic population data and data representing each of the projection scenarios: School Enrollment (SE), Employment (EMP), and Housing Units (HU). A range of patterns can be seen in the Region L graphics in each data section of this report.

10 <http://www.migrationinformation.org/datahub/state.cfm?ID=tx>: “The largest share of the foreign-born population of Texas were from Latin America. Of the total foreign-born population in Texas in 2011, 3.4 percent were from Africa, 18.5 percent from Asia, 4.5 percent from Europe, 72.2 percent from Latin America (South America, Central America, Mexico, and the Caribbean), 1.1 percent from Northern America (Canada, Bermuda, Greenland, and St. Pierre and Miquelon), and 0.2 percent from Oceania. At the national level, 4.1 percent were from Africa, 28.6 percent from Asia, 12.1 percent from Europe, 52.6 percent from Latin America, 2.0 percent from Northern America, and 0.5 percent from Oceania. The top three countries of birth of the foreign born in Texas were Mexico, El Salvador, and India [sic].* Of the total immigrant population in Texas in 2011, 59.6 percent were born in Mexico, 4.3 percent in El Salvador, and 3.9 percent in India. In contrast, the top three countries of birth in 1990 were Mexico (59.4 percent), Vietnam (3.6 percent), and El Salvador (3.1 percent). At the national level, the top three countries of birth in 2011 were Mexico (28.9 percent), India (4.6 percent), and china (4.6 percent). The top three countries of birth in 1990 were Mexico (21.7 percent), the Philippines (4.6 percent), and Canada (3.8 percent).

Average household size, 2006-2010 - (Average)	
County	Value
Atascosa	3
Bexar	2.78
Caldwell	2.95
Calhoun	2.6
Comal	2.59
DeWitt	2.47
Dimmit	2.67
Frio	3.13
Goliad	2.44
Gonzales	2.66
Guadalupe	2.84
Hays	2.71
Karnes	1.91
Kendall	2.57
La Salle	3.17
Medina	2.83
Refugio	2.43
Uvalde	2.9
Victoria	2.65
Wilson	2.82
Zavala	3.17

Figure 8: Sample from online list of PHH; source: <http://www.indexmundi.com/facts/united-states/quick-facts/texas/average-household-size#table>

Other considerations on method and data

Aside from general population behavior trends, evidence of patterns including economic, weather and other events can be traced in these charts. This study does not address any investigation into events such as these. Still, overall population activity can be inferred across the counties, especially apparent since the beginning of the extraction industry boom in 2008. Some show the multipliers falling, as would be expected if the PHH was being diluted by out-migration of families or in-migration of single workers, for example. These runs reflect a wide variation across the data types and the localities. It is important to note that some of the statistical analysis, because it uses historical data for the base of the Stepwise Autoregressive Method, takes historic downward trends into account, and may not reflect the sudden upward trend in population count anecdotally experienced by some counties. Without the addition of a rate of change weight, the population increase being experienced by Region L is not emphasized in the long term projections. In the sections on employment and school enrollment, a second set of statistical runs was done for the event period only, to capture the effects of the sudden change.

Demographic methodology is in the early stages of development and while some procedures such as regressions are recommended for assessing county level data, the projections themselves have been performed using time series methodology (Chesnais, 1983, 1990; Tayman, Smith & Rayer, 2011; Rayer,

2008; O’Neill, et al., 2001) An issue is preserving the “Bubble Effect” from punctuated economic and population activity, without the analysis ignoring it or smoothing it out as an outlier. That outlier data is the very focus of the problem addressed in this study; in some respects it has not been measured at all, in others, where it might have been measured, it has been erased through smoothing and substitution. Typical ratio techniques may not be sensitive enough when forecasting across large areas (Rayer, 2007), and “forecast errors for sub-county areas are sometimes very large, especially for areas with small population and high rates of population change” (Rayer & Smith, 2010)¹¹.

Experts recommend averaging forecasts from several techniques in order for the accuracy of forecasts to be improved (Rayer & Smith, 2010); this study used averages and comparisons when assessing baseline data as well as results. This study also sought a minimum of 10 years of historical data for base calculations, as that is recommended for short term time horizons (Rayer & Smith, 2010). “(A) few decades” is considered a short time horizon” and “historical data is useful” for accuracy (O’Neill, et al., 2001). For cases of missing data, multiple imputation (MI) techniques were recommended by U.S. Census documentation and an expert in Demographics in order to make judgments on data set comparisons (USBC, 1985; Colon-Lugo, 2013)¹². However, this study attempted to use full data sets for calculations, where possible. Some characteristic-based data, such as housing unit data, was difficult to obtain for all representative areas in Region L due to reticence and obtuse data retrieval systems used by governing bodies and utilities involved, thereby necessitating its use for triangulation and comparison only. This was done after a statistical method was used to calculate a usable range value from proxies for housing units. Other data retrieved was labeled in a highly generalized manner that rendered it unusable in most scenarios.

Of note, data from the Texas Education Agency (TEA) was not only easily retrieved, but reflected a very high quality that needed almost no treatment for input into calculations. Employment data was based on figures posted by the Bureau of Labor and Statistics, which draws on data from the Texas Workforce Commission and Community Population Survey, as well as from extraction industry employment figures provided by industry associations and the Railroad Commission of Texas. As housing unit based calculation is cited in demographic science literature as the premiere method for population calculation, freedom of information (FOI) requests for data regarding address counts, utility hook ups, and building permits were submitted. However, due to the lack of responses to requests for HU data, the only HU-related data source that was usable for this study came from the Texas A&M Real Estate Center as U.S. Census-based data for residential building permits, which, based on local zoning and reporting, was incomplete though it spanned consecutive years from 1990 to the present.

11 Rayer and Smith 2010, p 158 Note: 1. For trend extrapolation techniques such as those evaluated in this article, ten years of base data are generally necessary to achieve the greatest possible forecast accuracy for ten- and twenty-year forecast horizons. In most instances, ten years are also sufficient, as increases beyond ten years generally do not lead to further improvements in accuracy.

2. Precision declines steadily with the length of the forecast horizon—often in a nearly linear manner—but bias follows no clear pattern. Forecast errors for sub-county areas are sometimes very large, especially for areas with small populations and high rates of population change. The size of the errors reported in this article may be disappointing to data users, but we believe it is a realistic indication of the degree of uncertainty inherent in small-area population forecasts.

3. Precision is strongly affected by differences in population size, but bias is not. We found precision to be lower for subcounty areas with fewer than one thousand residents than for areas in any other size category, often by a substantial amount. For most techniques, precision improved steadily as population size increased to about five thousand, but further increases led to only minor improvements. (see also: Rayer, S. and Smith, S. 2010. *Journal of planning education and research*, Volume 30, Issue 2, pp. 147 - 161 Case study of Florida)

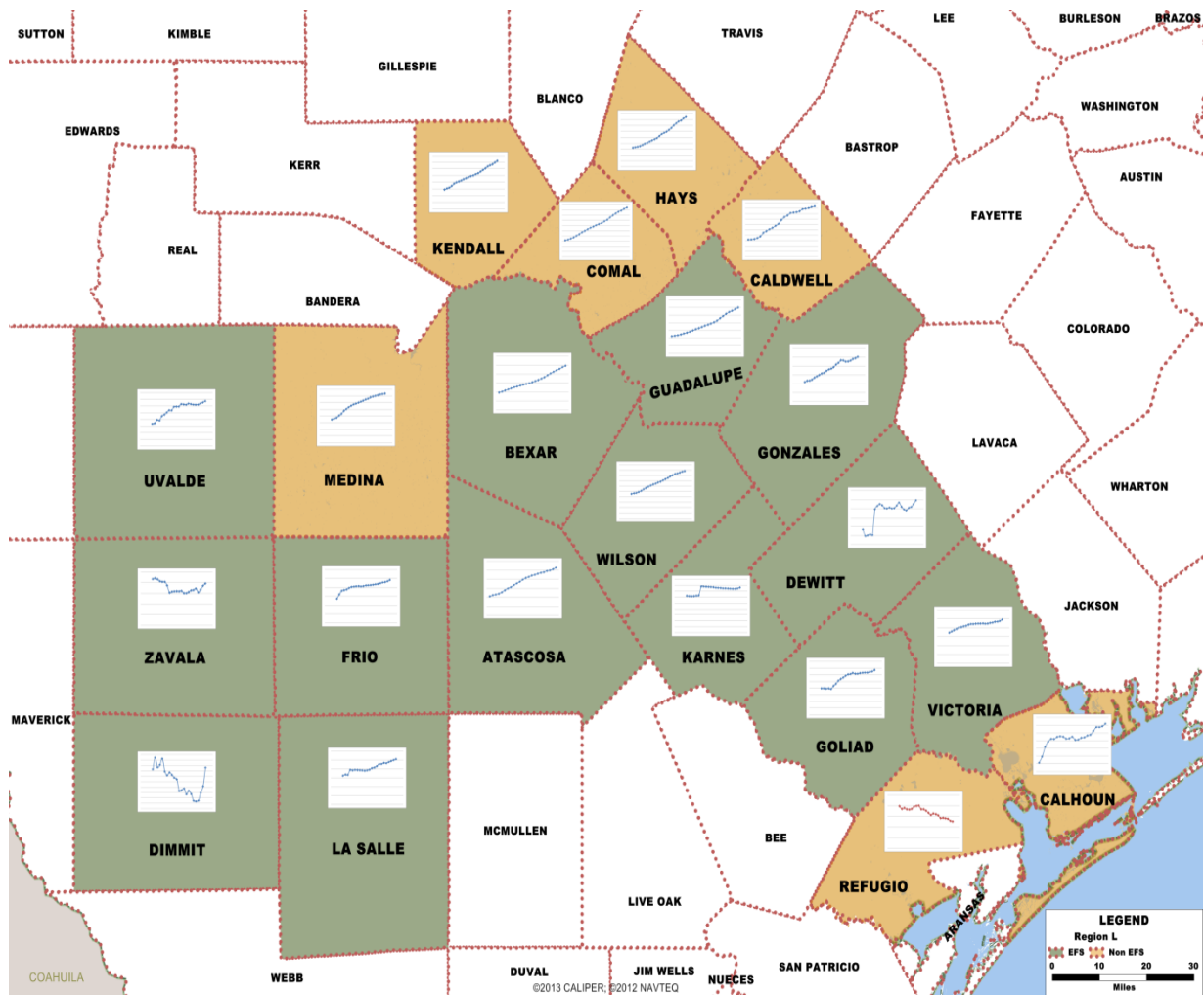
12 Kenward, M. & Carpenter, J., 2009. Missing data methods in longitudinal studies: a review. *Test*, 18: 65–67, p67: “. . . pattern-mixture formulation . . . We have found such an approach can be very helpful in explaining to others the assumptions underlying the analysis. Although such analyses can be constructed through direct likelihood methods, MI provides a convenient computational framework. Further, the imputed data can be readily used to explore the ‘selection’ implications of the pattern mixture model, which can be a valuable diagnostic.”

SECTION II

The following section includes information on the data and analysis for population projections based on employment, housing units and school enrollment for Region L.

Population Analysis

Below is a map of Region L with charts for each county's historic population trend for 2000-2012 superimposed. For most counties, the overall trend is generally upward for population; however some counties show losses over the past decade. Urban counties generally show a steeper, positive slope than rural counties until the EFS time period, which reflects the magnitude of population density increase and range.

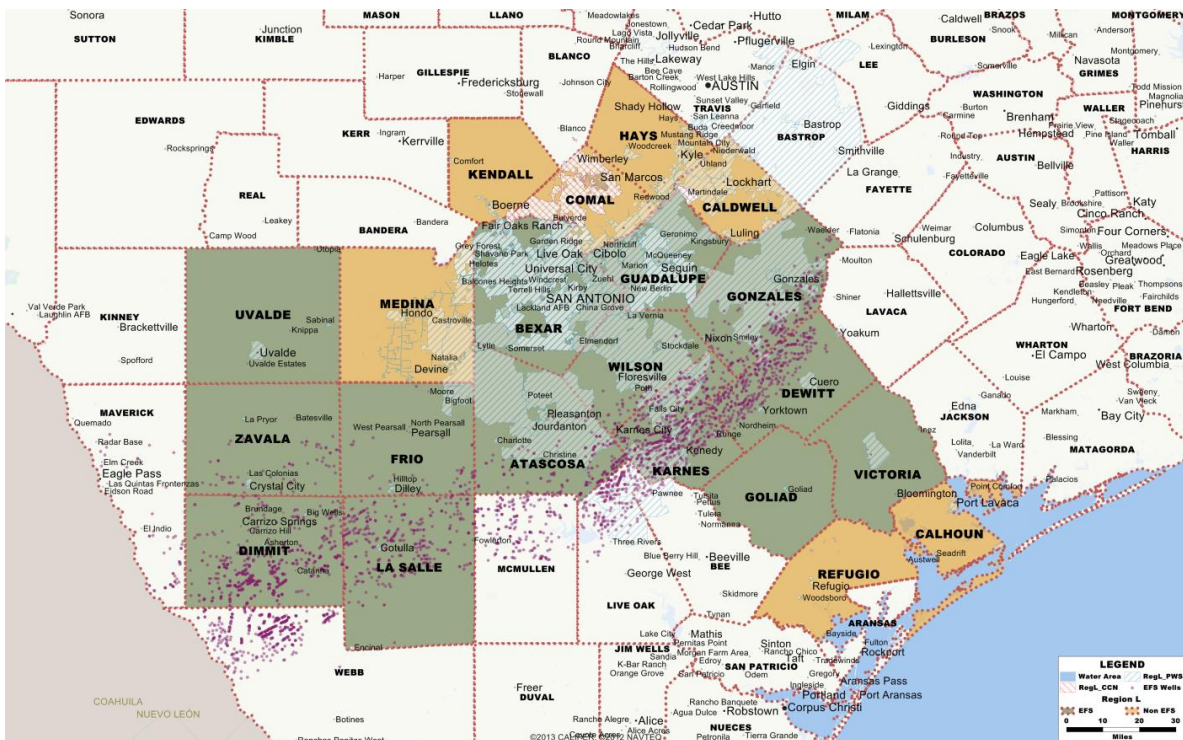


Map 5: Charts of Population 2000-2012 for Region L Counties; source: CCBR GIS

Population Projection I – Eagle Ford Shale Workforce Analysis

Texas State data from Tracer 2 was collected for all 21 Region L counties. Initial analysis was done for all counties with this data and run against the three scenario projections made available from the Texas State Data Center’s office of the State Demographer (TSDC, 2012).

It should be noted that past CCBR research in the Eagle Ford Shale (EFS) extraction industry area encompassed in Region L, as well as research in other extraction industry areas across the nation, have shown patterns of sudden punctuated increase on top of the “normal” rate of population growth, followed by one or more dramatic decreases before leveling off to a new “normal” rate of population growth. In fact, some areas associated with extraction industry impacts have seen more outward migration after the “boom” period, resulting in a new “normal” that is lower than the original “normal” population rates. Sustainability of population through and after the “boom” event is a quantified problem. Also, market effects, which are not tracked in this study, can lead to wide variation in extraction industry activities and development over time and territory. Indeed, some volatility in the EFS area development has been linked to market pricing, as well as to corporate competition, support industry development (pipeline, etc.), and national energy policy. That said, even with a near-future rise in population, over time, a fall of population is likely without economic development outside of the extraction industry and associated economic support activities (CCBR, 2012, 2013).



Map 6: Region L Water User Groups and Eagle Ford Shale Well locations; source: CCBR GIS

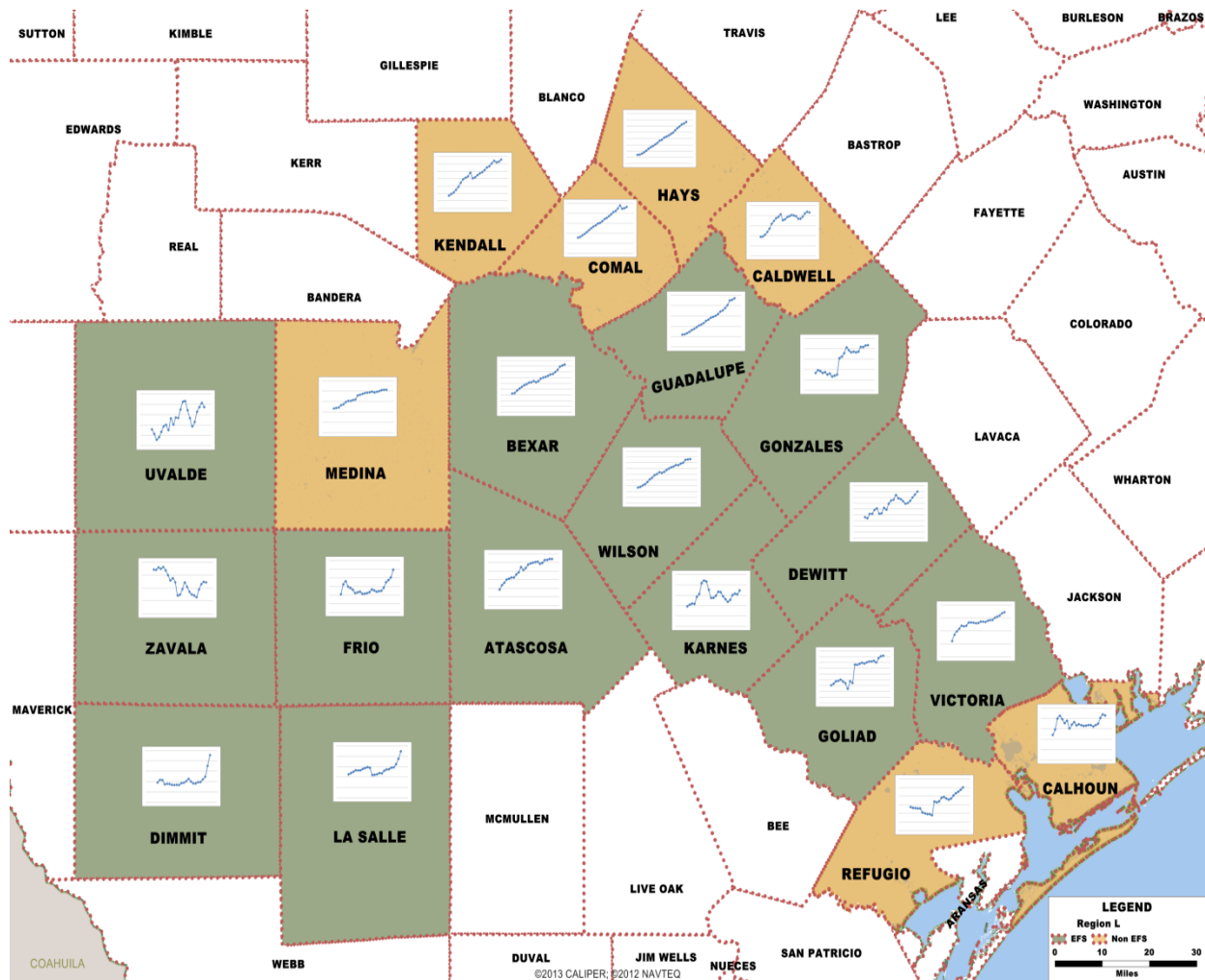
Employment Analysis Data

The first Region L population projection was based on Employment (EMP), due to the suspected population increases related to the Eagle Ford shale extraction industry activities in the South Texas area. This is a pattern seen in other regions around the country that have experienced punctuated activity due to extraction industry developments (Deller & Schreiber, 2012; Carlino & Mills, 1987). “As the national economy struggles to recover from the Great Recession, the high price of oil and the increasingly large potential for natural gas consumption has created economic opportunities for rural communities” (Deller & Schreiber, 2012). As noted by the U.S. Census Agency concerning methodology and assumptions related to population projections, it is important to “establish a candid view of the uncertainty surrounding . . . projections” related to in-/out- migration (Hollmann, et al., 2000). Therefore, this study has looked at the environment of the industry-labor force situation as well as at raw numbers collected for analysis in order to better understand and interpret results. The Bureau of Labor and Statistics defines labor force as the population of available employable persons, including employed and unemployed. In this study we use “employment (EMP)” as a designator for this variable, as we are dealing with a temporary as well as permanent employment pool related to statistical testing.

County level data was used for the Region L counties. The map above illustrates the EFS-affected counties in green, non-EFS counties in orange, with the Water User Group (WUG) boundaries in blue and well sites in purple overlaid on the area. Persons-per-household multipliers (PHH) were calculated from a ratio of historic EMP to population, initially from 1990, then for analysis in this study, from 2000 to 2012, in order to uncover transition patterns and maintain uniformity across all three cohort characteristic data sets (EMP, HU, SE). A secondary forecast method used data from the recent extraction period that started in 2008. The period from 2000 to the present are referred to here as the “historical” period, and the years 2008 to the present are referred to as the “event” period, when recent Eagle Ford Shale extraction activities began to impact the Region L area with a punctuated effect on population and on related factors. Some counties have had historic drilling activities in the area, while others have only been involved mainly during the event period, either directly or indirectly. Time series were based on historical trends, as recommended by the U.S. Census (USBC, 2012)

Texas State data from the Bureau of Labor Statistics, Texas Workforce Commission, and the related online report tool Tracer 2 was collected for all 21 Region L counties. Initial data was taken from the Labor Market and Career Information Department of the Texas Workforce Commission’s governmental data. That information from the Trace2 database is shared with the Bureau of Labor Statistics. For 21 counties, a total population and a labor force population was recorded for years 2000-2012. The total population represents the total number of people currently located within each specific county at that time. The labor force population represents individuals, aged 16-65 years, who currently employed within a specific county, as well as those who are unemployed and actively seeking employment at that time. The portion of the populations that is not included within the labor force population are individuals not within the specific age limit and those within the specified age limit who are retired, students, those who are taking care of family members (i.e. stay-at-home mothers/fathers) and individuals who are unemployed, but not actively seeking employment. Information regarding employed and unemployed person was also gathered from the Trace2 database, though, ultimately, these numbers were not used in the forecasting methods for overall population. Further information about employment data collection is found at the BLS website.¹³

¹³ “The principal source of benchmark data for private industries is the Quarterly Census of Employment and Wages (QCEW). Non-covered employment results from a difference in scope between the CES program and the QCEW program. The QCEW only includes employment data provided to State Employment Security Agencies by employers covered by State UI laws. BLS uses several other sources to establish benchmarks for the industries partially covered or exempt from mandatory UI coverage, accounting for nearly 3 percent of the nonfarm employment total. Data on employees covered under Social Security laws, published by the U.S. Census Bureau in Country Business Patterns,



Map 7: Region L with 2000-2013 county employment charts; source: CCBR GIS

are used to augment UI data for industries not fully covered by the UI scope, such as Non-office insurance sales workers, child daycare workers, Religious organizations, and Private schools and hospitals. Non-covered employment for State and Local government hospitals and Educational institutions is based on the Annual Survey of Public Employment and Payroll (ASPEP) conducted by the Census Bureau. Non-covered employment data from these sources are available only on a lagged basis. Extrapolation to a current level is accomplished by applying the employment trends from the UI-covered part of the population in these industries to the non-covered part. Universe data for interstate railroads are obtained from the Railroad Retirement Board. More information on calculating non-covered employment in the CES program is available in the CES Technical Notes at www.bls.gov/ces/cestn_hm#NCE



Figure 9: Royalty Partners; source: www.royaltypartners.com

Additional historical labor force numbers were also gathered for 1990-2012 in order to establish a baseline for the time series analysis. A ratio of total population to labor force population was calculated for each county for years 2000-2011. This ratio, the person-per-household (PHH) multiplier, was used to project the 2050 estimated total population for each county. This table is shown in Result 2, in the results section below.

The charts of both the multiplier and employment patterns over time help illustrate how the PHH size based on employment has been affected periodically by such things as economic events, where there might be a downturn in the trend due to population transition. With a big influx of employed, as is shown in many areas affected by extraction activities, we would also expect to see the multiplier go downward, as PHH is diluted by single-person households.

Eagle Ford Shale (EFS) workforce analysis impact data on employment were compared with data from other sources for 12 EFS active counties and 2 non-EFS active county data sets; the data was derived using IMPLAN software in an economic impact analysis for the Eagle Ford Shale area. Information about the impact related data is discussed later in this section.

The EMP data was compared with the figures from the Texas State Demographer's (StDmg) Office (TSDC, 2012). The StDmg scenarios of 0 (normal migration patterns), .5 (conservative migration patterns), and 1 (aggressive migration patterns) used the same initial numbers from the 2010 U.S. Census count.

The table below shows the 2010 breakdown of labor force in employment and unemployment from the Texas Workforce Commission Tracer2 online reporting tool, as well as Census population numbers used by the State Demographer's office for population projections. The proportion of total population listed as available for employment was calculated.

Table 1: 2010 TWC Labor Force and CENSUS Population data; source: SARA Region L Population Forecast I EFS Workforce Analysis.xls

2010 TWC Labor Force and CENSUS Population Data						
Year	County	Labor Force	Employment	Unemployment	Census Population	Labor Force % of Pop
2010	Atascosa County	19,572	18,014	1,558	44,911	0.44
2010	Bexar County	796,464	736,617	59,847	1,714,773	0.46
2010	Caldwell County	16,411	14,973	1,438	38,066	0.43
2010	Calhoun County	10,057	9,173	884	21,381	0.47
2010	Comal County	54,479	50,702	3,777	108,472	0.50
2010	DeWitt County	9,503	8,763	740	20,097	0.47
2010	Dimmit County	4,462	4,051	411	9,996	0.45
2010	Frio County	7,741	7,131	610	17,217	0.45
2010	Goliad County	3,549	3,297	252	7,210	0.49
2010	Gonzales County	10,167	9,544	623	19,807	0.51
2010	Guadalupe County	64,993	60,597	4,396	131,533	0.49
2010	Hays County	82,481	76,783	5,698	157,107	0.52
2010	Karnes County	5,581	5,065	516	14,824	0.38
2010	Kendall County	16,408	15,404	1,004	33,410	0.49
2010	La Salle County	3,243	2,972	271	6,886	0.47
2010	Medina County	20,526	19,003	1,523	46,006	0.45
2010	Refugio County	4,252	3,962	290	7,383	0.58
2010	Uvalde County	11,869	10,820	1,049	26,405	0.45
2010	Victoria County	45,994	42,650	3,344	86,793	0.53
2010	Wilson County	19,990	18,535	1,455	42,918	0.47
2010	Zavala County	4,147	3,511	636	11,677	0.36



Figure 10: Eagle Ford Texas' dark-horse resources play; source: www.worldoil.com, June 2011

The table below shows the percent change in labor and population during the event period of 2008-2012. Rates of increase over 10% are in bold. Note that Dimmit, Frio, and La Salle counties register from 30-65% increases of labor force. This table is discussed in Result 3 in the results section below.

Table 2: 2008-2012 TWC Labor Force and CENSUS Population data; source: SARA Region L Population Forecast I EFS Workforce Analysis.xls

2008-2012 TWC Labor Force and CENSUS Population data						
County	2008 LF	2012 LF	2008 POP	2012 POP	08-12 LF % change	08-12 POP % change
Atascosa	18,885	19,767	43,947	46,446	4.67%	5.69%
Bexar	747,982	815,285	1,651,709	1,785,704	9.00%	8.11%
Caldwell	15,359	16,604	37,671	38,734	8.11%	2.82%
Calhoun	9,369	10,284	21,127	21,609	9.77%	2.28%
Comal	54,621	56,249	103,272	114,384	2.98%	10.76%
Dewitt	9,033	10,022	19,902	20,465	10.95%	2.83%
Dimmit	3,963	6,552	9,833	10,461	65.33%	6.39%
Frio	6,856	8,924	16,939	17,702	30.16%	4.50%
Goliad	3,462	3,636	7,164	7,351	5.03%	2.61%
Gonzales	9,730	10,336	19,538	20,045	6.23%	2.59%
Guadalupe	57,667	67,059	123,398	139,841	16.29%	13.33%
Hays	76,518	86,785	147,674	168,990	13.42%	14.43%
Karnes	5,279	5,729	14,867	15,233	8.52%	2.46%
Kendall	16,115	17,131	31,754	35,956	6.30%	13.23%
La Salle	2,905	4,487	6,653	7,109	54.46%	6.85%
Medina	19,695	20,667	45,131	46,765	4.94%	3.62%
Refugio	4,032	4,513	7,430	7,259	11.93%	-2.30%
Uvalde	11,147	11,871	26,206	26,752	6.50%	2.08%
Victoria	45,150	47,263	85,762	89,269	4.68%	4.09%
Wilson	18,707	20,287	41,657	44,370	8.45%	6.51%
Zavala	3,645	4,214	11,725	11,961	15.61%	2.01%

Patterns of Extraction Industry Activities and Socio-Economic Impacts

CCBR research in the extraction industry area encompassed in Region L, as well as research in other extraction industry areas across the nation, has shown patterns of sudden punctuated increase on top of the “normal” rate of population growth, followed by one or more dramatic decreases before leveling off to a new “normal” rate of population growth (CCBR, 2012). In fact, some areas associated with extraction industry impacts have seen more outward migration after the “boom” period, resulting in a new “normal” that is lower than the original “normal” population rates. Sustainability of population through and after the “boom” event is a quantified problem. Also, market effects, which are not tracked in this study, can lead to a wide variation in extraction industry activities and development over time and territory. Indeed, some volatility in the EFS area development has been linked to market pricing, as well as to corporate competition, support industry development (pipeline, etc.), and national energy policy. That said, even with a near-future rise in population, over time, a fall of population is likely without economic development outside of the extraction industry and associated economic support activities.

There are important circumstances and patterns that have been shown to develop in areas where an increase in mining and petroleum industry activities occur. One is called the “resource curse”, and another

deals with infrastructure and housing pressures (Humphreys, Sachs, & Stiglitz, 2007; James & Aadland, 2011; Bangsund & Hodur, 2012, 2013). The “resource curse” is defined as a situation where sudden economic activity in an area, due to highly specialized extraction processes of mineral resources intrinsic to an area and its high value outside of that area, leads to the export of the economic wealth and process infrastructure. This export occurs not only while the extractions is being performed, but after initial activities subside, as jobs that were created leave the area, in addition an exodus of support business. Without development of a sustainable portfolio of economic enterprise, the impacted area ends up worse off than it was before the activity. Some studies cite more jobs lost after development ceases than were created by the development (Deller & Schreiber, 2012). Another issue is the influence of markets, and

“cost-price squeezing, [where] production may cease even with abundantly available supplies of raw materials. That is, world price for the commodity drops below an economically feasible price to extract them mining activity ceases and when prices return to higher levels mining activity returns. This inherent instability or flickering effect stunts local economic growth. Because of uncertainty associated with this flickering effect, other non-basic businesses, such as consumer services and retail, do not grow in response to the mining operations.”

“Regional variation ... [is]... pervasive” (Freudenberg & Wilson, 2002) and “regional variation in the impact of mining operations on the local communities hinges on the extent to which the mining industry is integrated into subsequent economic and infrastructural development. This goes back to the notion of economic diversification in the long run: do communities use the short-term injection of economic activity associated with the mine to support other types of economic growth and development?” (Deller & Schreiber, 2012; Freudenberg, 1992; Freudenberg & Gramling, 1994)

Another issue is the mobility of extraction industry labor force members, and the industry structure of companies outsourcing specialty jobs to other companies with highly specialized employees. “Employment to population ratio and share of total mining” to all other industries is important; Bradbury (1984) suggested that the mobility of workers is often overlooked in studies of the effects of mining on local communities” (Deller & Schreiber, 2012). One of the investigations this study pursued was an examination of petroleum-mining industry share in relation to overall industry proportions for employment; Called “Sector 21” after the NAICS code the Federal Government uses. This petroleum-mining industry encompasses not only direct mining and extraction, but types of specific specialty construction and services used in the industry. Several companies have posted time-lapse videos online that show the various colors of company trucks, uniforms and hat colors changing over time as different stages of the well development calls for the different specialized skills and equipment offered by a variety of companies.

This photo shows a worker in a red hardhat and safety clothing walking among petroleum equipment and piping, an illustration of the specialized environment and skillset required.



Figure 11: A Word to the World; source: Archives for December 2012, www.interdasglobal.com

A Marathon Oil Company time-lapse video of well activity in 2012 shows the many stages and specialty operations that focus on a drilling site; an animation video explains the process.



Figure 12: Timelapse of drilling & fracking a well; source: Youtube, http://youtu.be/6_j7UkuzJTU; Animation of Fracturing, <http://www.youtube.com/watch?v=VY34PQUiwOQ>

The figure below, from a long term study related to the Bakken Shale in North Dakota, illustrates some of the pressures faced by sudden extraction industry impacts. The first slide shows a breakdown of the types of activities, some of which develop in size before or after other stages of activities. Many of the stages are outsourced to a value-chain of specialty companies or are accomplished in partnership between leaseholder/owners and services companies. Therefore, crews may move as their skill types and service company stage develops in an area of drilling.

Petroleum Sector Employment Dynamics within the Industry

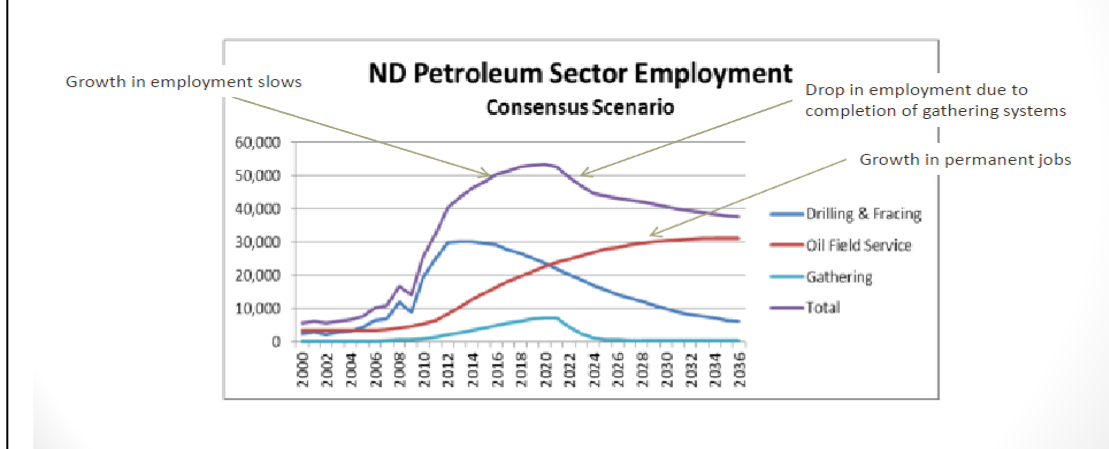


Figure 13: Graph of Petroleum Industry Dynamics; source: Bangsund & Hodur, 2013

The next figure shows the difference between “permanent” Sector 21 employed workers that have been engaged with industry activities in the region over time, and “Temporary” Sector 21 workers who come into an area due to demand for workers. The Bakken-affected region has a history of mining, including petroleum, rock, sand and metals, so there is a basic Sector 21 employment pool in the area. The “temporary” bubble, shown in red, over the blue “permanent” portion of employment, eventually tapers off as some of those workers are absorbed into the permanent workforce, while others move on to the next boom area that needs an influx of specialized workers. Over time an expected decrease occurs as the transition period is normalized (Hollmann, et al., 2000)

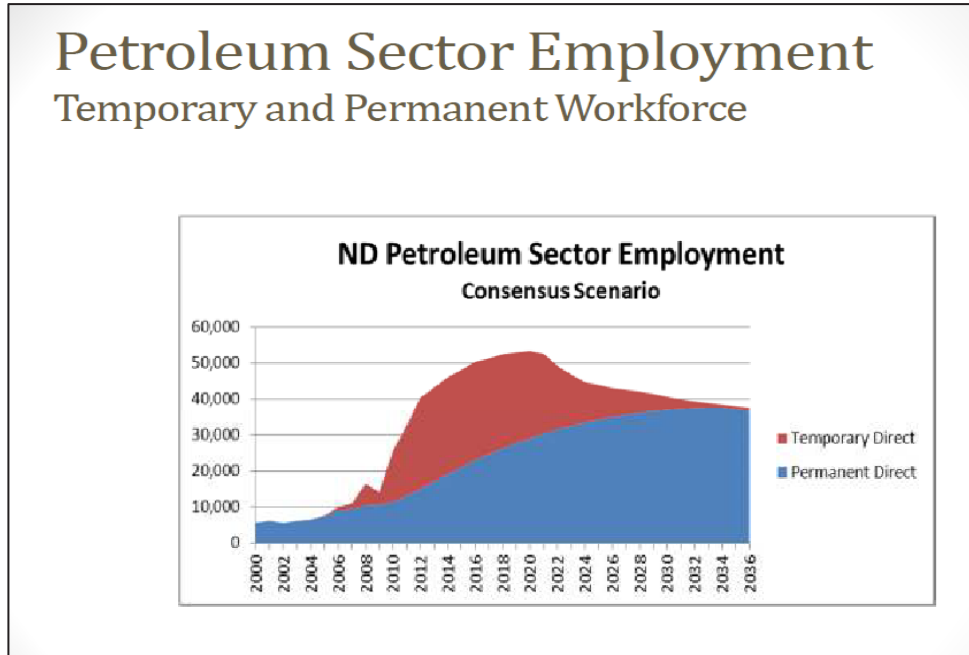


Figure 14: Graph of Petroleum Industry Temporary and Permanent Employment; source: Bangsund & Hodur, 2013

This illustration shows the geologic strata that is the focus of drilling. Some areas in Region L are experiencing more density of wells due to the locations and depths of the play layers.

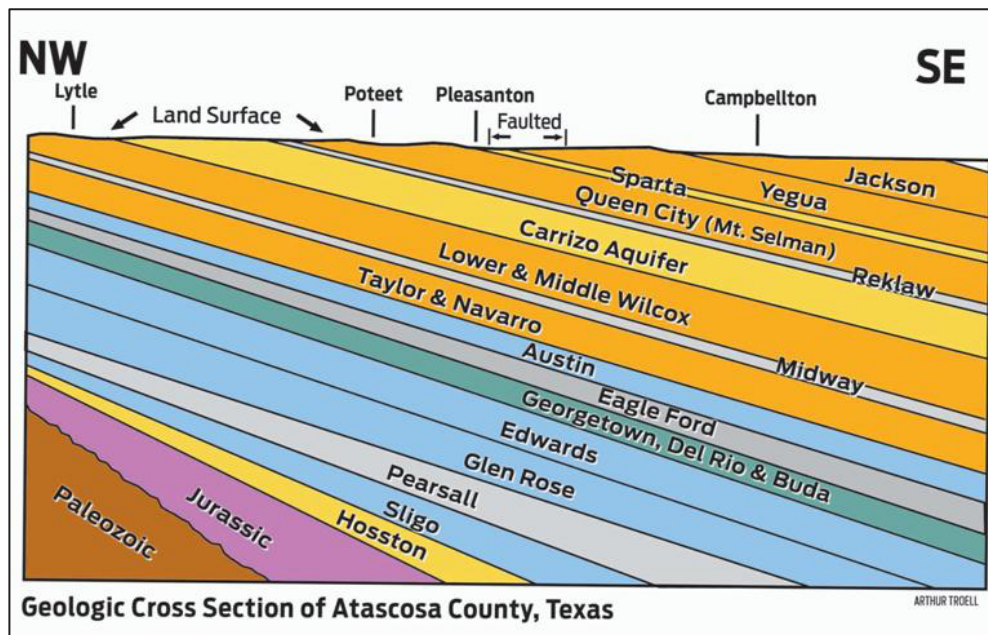


Figure 15: Illustration of Shale Layers; source: The Eagle Ford Shale And...What Else Is Down There - The Champion Group, Oil and Gas Direct Investments Industry, www.championgroup.com

The third figure shows non-Sector 21 employment in green, with the Sector 21 employment in blue, and a layer of support industry employment shown in red. Right before the “bubble” increase and beginning of support (red) employment, there is a dip in the non-Sector 21 employment, as workers are “stolen” from other industries into Sector 21 jobs. This can be due to perceived advantages by workers of higher wages,

skill demands, marketing for applicants by highly organized companies, or the draw of a better future through a specialty career path. This figure illustrates a “consensus” scenario, reflecting an assumption where “future factors [are] similar to current conditions” related to rate of development and size of development, as well as “economics, geology, and regulatory elements” (Bangsund & Hodur, 2012).

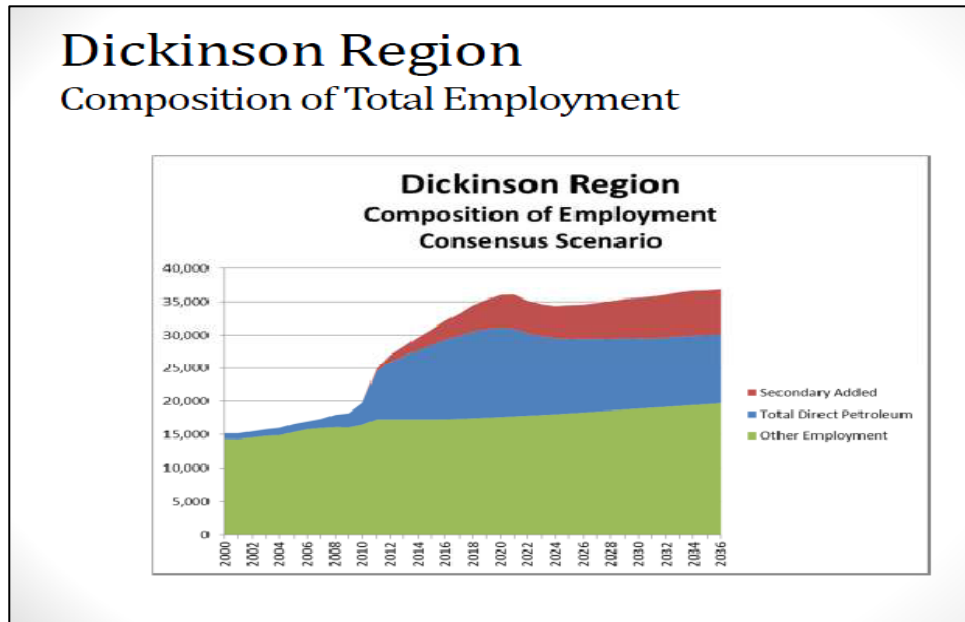


Figure 16: Graph of Employment types with Initial Non-Sector 21 Dip; source: Bangsund & Hodur, 2013

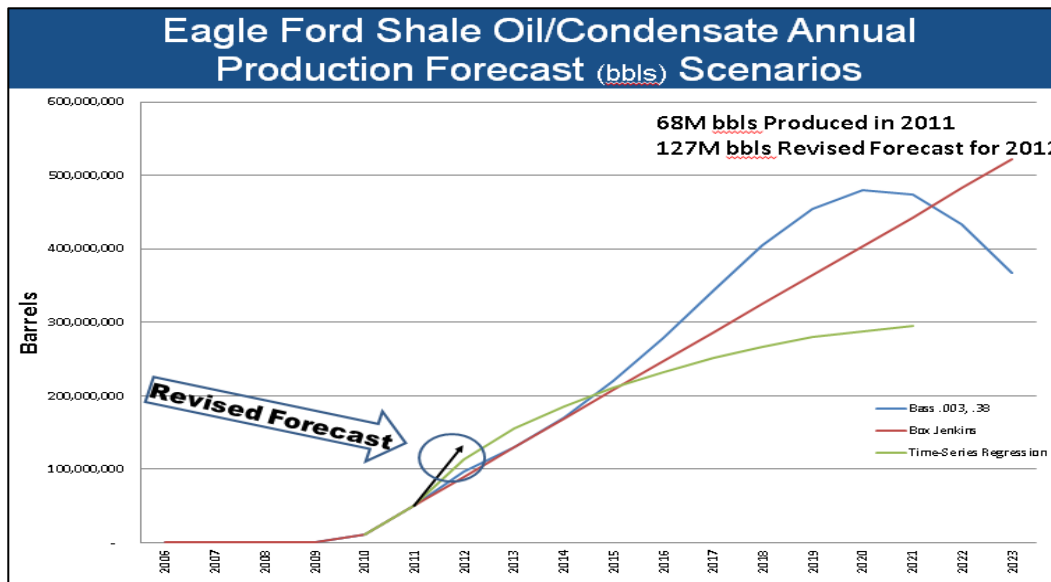


Figure 17: Presentation Slide; source: CCBREFS

The figure above, from CCBREFS research, shows the various types of forecast trends that result from different methodologies and a revision based on market information.

The pivotal part played by a one-sided economic impact on local economies is

“[N]oted by Gunton and Day (2003) as well as Bridge (2008), [as] the external sources of investment for mining projects create a spread effect that drives economic expansion, moving the

regional economy from a lower level equilibrium of development to a new equilibrium of higher levels of socio-economic well-being. The initial investments jumpstart the economy and the extraction and export of the resource spurs a cycle of economic growth.

Much of the research that examines mining within developing nations concludes that very little of the economic benefits are retained in the local economy because of the ownership structure of mining firms and lax environmental or labor safety standards. The economic historian Innis (1956) studied the case of Canadian specialization around resource extraction and found that such activities did not drive economic diversification but rather a form of dependency on an unstable industry. Bridge (2008) noted that the majority of the resource curse literature finds robust economic growth associated with development from resource extraction to be a rarity as opposed to a general rule (Ross 1999; Sachs and Warner 1999; Watts 2005; Rosser, 2006)”

“Cushing (1999) studied the Appalachian region of the United States and found that many of the low skilled jobs in mines attract a labor force that may limit future economic growth and contribute to higher poverty rates. Lockie, Franettovich, Petrokova-Timmer, Rolfe & Ivanova (2009) found increased anti-social behavior, such as traffic-related accidents and increases in criminal activity, a few years after the boom in commodity prices” (Deller & Schreiber, 2012)

In addition to the discussion of Sector 21 employment is the matter of other types of employment, as trade and services see the opportunities for new venturing and expansion. Companies selling water, providing lodging and meals, as well as entertainment and support for banking, phone services and transportation have seen a big increase in presence in the EFS area (Texas State Comptroller, 2013). Even where drilling is not occurring, adjacent cities have become sites for headquarters, sources of supply partners, as well as outlets for staffing, social services, education, entertainment and logistical support (CCBR, 2012). On top of the current development corridors between major metropolitan hubs- Austin, Houston, Dallas-Fort Worth, EFS has boosted South and West Texas into a “fastest growing” area in the United States.

This photo shows a variety of vehicles, structures and equipment.



Figure 18: Doxa Energy Corp; source: www.doxaenergy.com, 2013

One of the limiting factors on employment growth in Sector 21 areas is housing the influx of workers. The second projection for this study addresses the topic of population related to Housing Units, but related to Employment, the pressure on infrastructure by massive in-migration of transitory workers can be felt in access to utility, water, roads, government services and communications support, among other

things (CCBR, 2012). Workers who have little access to convenient shopping for food and clothing may be very hesitant to bring families to an area, and may be more inclined to move between areas or even to commute in from larger cities, rather than stay and become established members of communities that they do not see as fulfilling or able to cater to their needs and interests. In fact, vast areas in the Eagle Ford Shale impact region do not have many towns, as they have been traditionally rural, agricultural areas, inhabited by crops, animals and ranchers. Many workers who have been interviewed for past studies noted that they stay in the work area while “on the clock” and travel back to other parts of the state or to other states where their homes and families are, during their off time (CCBR, 2012). The propensity of workers in the area to move and so, be hard to count due to their work at and between multiple remote areas and sites has made this population almost invisible in terms of counting. Companies hesitate to provide work records of employees and their locations, due to privacy and competitive concerns. Tracking through pay records may locate workers as associated with distant headquarters or offices. As mentioned before in this study, the Census does not count people living in transitory residence. However the presence of this worker influx is felt in raising costs for limited housing and supplies, in raising crime rates, and in heavier traffic on rural roads and highways (Lockie, Franettovich, Petrokova-Timmer, Rolfe & Ivanova, 2009; CCBR, 2012)



Figure 19: Oilfield Job Outlook in the Eagle Ford Shale in South Texas area; source: www.energyindustryphotos.com

Eagle Ford Shale Sector 21 and Impact Study Information

The employment data taken into consideration for this study was gathered from publicly available government sources. A secondary investigation collected data for the sector 21 portion of the job market. Sector 21 refers to all those who work within the mining, oil, and gas field of employment. Past employment data, for years 1998-2010, within sector 21, was recorded for the Region L counties. However, this data was incomplete and varied across the years; some data was only available annually, while some was available quarterly and monthly. Because reported numbers can include labor force from previous periods or those new to that period and do not report movement from one occupational code to another within a period, the Section 21 data was not compiled and used for this study.

For a localized study of economic impact, Eagle Ford Shale job information, including 14 directly impacted and six indirectly impacted counties, was also taken into consideration when determining forecasted population growth trends. The Eagle Ford Shale economic impact report, from UTSA’s Institute for Economic Development, provides an estimate for the number of jobs supported by the Eagle Ford, not newly created jobs within the shale. Using IMPLAN, economic software currently available from the Minnesota Implan Group (MIG) and packaged under the auspices of the United States

Department of Agriculture and The University of Minnesota, impacts were obtained and categorized into three identifiable categories; direct, indirect, and induced. Directly impacted jobs are directly related to the Eagle Ford Shale, such as oil field workers, truck drivers, and refinery workers. Indirectly impacted jobs are positions that are supported by the Eagle Ford Shale but are not directly related. These positions include employment in industries that provide resources to the Shale (i.e. pipeline materials). For example, office positions typically located in the six outlying counties and any other positions which assist in the ongoing growth of the Eagle Ford, though not directly, are considered indirect. Jobs included in the induced impact are jobs that are supported by the shale by catering to the needs of the growing populations within each county. Restaurants and hotels, located within these twenty counties, provide jobs that are part of the induced impact. The Eagle Ford Shale economic impact also provides a breakdown of supported jobs by occupational field and educational attainment. Since the growth of the Eagle Ford Shale, jobs within the impacted counties require a higher level of education and have increased in the oil and gas industry. Although drilling and extraction is expected to be the dominate industry for years to come, more jobs that require a higher education will increase as production increases.

Results

The findings for population projections based on the data relative to the historic and event periods show variation across counties. Note that for some counties that were losing population going into the projection, an aggressive scenario can show a steeper loss over time of population. Therefore, it is important to look at the general shape, as well as the final projection numbers to compare characteristic-based projections with census based StDmg projections. County findings are summarized in the discussion section of this study.

Result 1): Historic count data

Result 2): PHH multiplier

Result 3): Percent change

Result 4): Historic Comparison of Data-based and StDmg population projections

Result 5): Historic County Forecast charts, see XLS

Result 6): Event Comparison of Data-based and StDmg population projections

Result 7): Event County Forecast charts, see XLS

Data for Employment was analyzed and is illustrated as follows:

Result 1) TABLE 3: Historic counts per year per county were graphed to show movement over time. This shows general increases and decreases over the past 12 years in EMP and may reflect families moving out of (downward slope) or into (upward slope) a county. It is interesting that counties with EFS activity show a sudden change to a positive direction around the time of the event period and high extraction industry activity, in conjunction with high market prices for petroleum products.

Table 3: 1990-2012 BLS Labor Force Numbers; source: SARA Region L population forecast I EFS workforce analysis.xls\emp total hist graphs

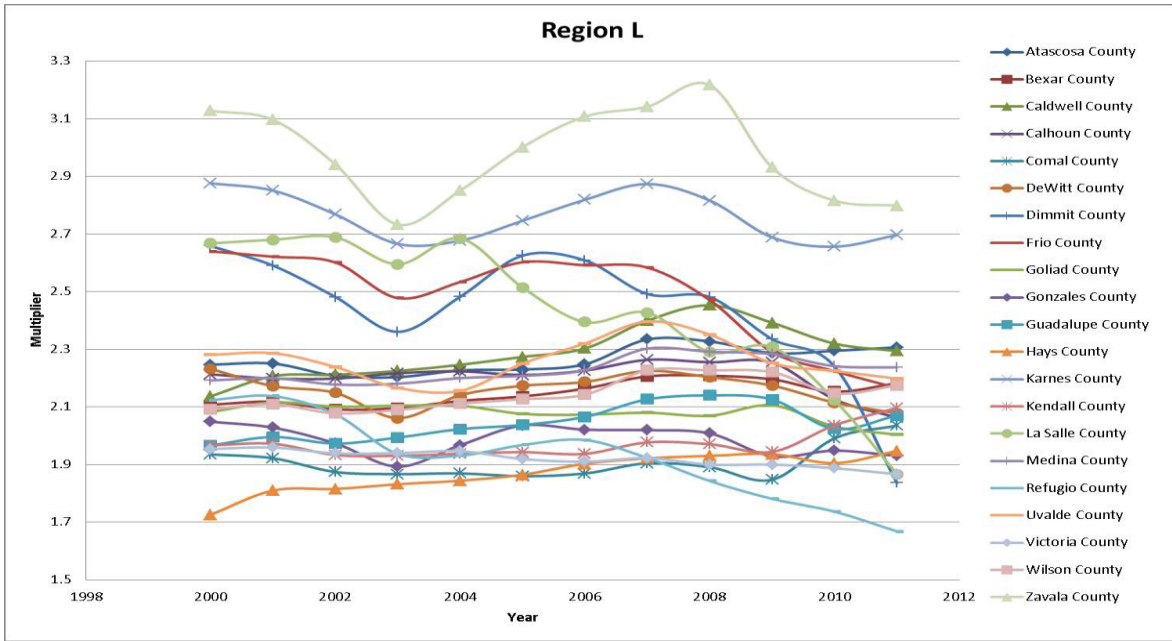
1990 - 2012 Labor Force

Year	Atascosa	Bejar	Caldwell	Calhoun	Comal	DeWitt	Dimmitt	Frio	Goliad	Gonzales	Guadalupe	Hays	Karnes	Kendall	La Salle	Medina	Refugio	Uvalde	Wilson	Victoria	Zavala
1990	12,693	562,078	11,747	8,410	25,684	7,791	3,918	6,092	2,608	7,664	32,113	33,900	4,964	7,392	2,243	11,668	3,367	10,796	10,373	36,186	4,713
1991	13,714	566,456	11,816	8,945	26,379	7,702	4,170	7,230	2,663	7,931	32,319	34,396	5,045	7,845	2,373	11,926	3,316	10,580	10,592	38,617	4,696
1992	14,264	587,423	12,189	9,989	27,861	8,075	4,142	7,609	2,742	7,843	33,453	35,922	5,102	8,262	2,502	12,178	3,313	10,295	11,062	39,904	4,793
1993	15,004	604,733	12,735	10,264	29,407	8,078	3,741	6,987	2,763	7,658	34,754	38,197	5,088	8,992	2,657	13,244	3,292	10,417	11,546	40,876	4,739
1994	15,219	619,022	13,377	9,933	31,287	8,418	3,797	6,807	2,802	7,740	36,423	40,853	5,426	9,771	2,633	13,686	3,288	10,675	12,288	42,083	4,807
1995	15,495	635,017	14,342	9,548	33,147	8,554	3,780	6,622	2,736	7,511	37,672	43,671	5,565	10,926	2,641	14,792	3,057	10,937	13,202	41,802	4,679
1996	15,488	644,157	14,923	9,786	34,966	8,094	3,693	6,237	2,680	7,604	39,085	46,317	6,083	11,786	2,777	15,302	3,009	11,013	13,819	42,103	4,498
1997	16,184	656,870	15,459	9,045	36,731	8,122	3,674	6,320	2,486	7,327	40,816	48,073	6,208	12,235	2,869	15,329	2,968	10,761	14,678	43,334	4,291
1998	16,687	661,585	15,731	9,405	37,838	8,612	3,697	6,395	2,751	7,404	41,727	50,487	6,164	12,600	2,946	15,698	2,967	11,322	15,058	43,318	4,376
1999	17,907	670,617	16,253	9,648	39,700	8,436	3,676	6,145	2,690	7,508	43,189	53,046	5,765	13,607	2,889	15,935	2,896	11,026	15,680	43,276	4,211
2000	17,195	660,930	15,067	9,330	40,319	8,966	3,855	6,156	3,328	9,093	45,283	56,553	5,370	12,076	2,199	17,932	3,686	11,367	15,489	43,040	3,709
2001	17,699	670,069	15,251	9,444	41,956	9,238	3,872	6,224	3,318	9,228	46,414	57,876	5,381	12,389	2,214	18,208	3,633	11,345	15,841	43,129	3,745
2002	18,464	691,858	15,698	9,348	44,182	9,315	4,047	6,330	3,356	9,568	48,282	61,367	5,483	12,921	2,268	18,693	3,695	11,754	16,486	43,626	3,949
2003	18,748	701,116	15,881	9,282	45,445	9,719	4,268	6,650	3,391	10,133	49,224	63,150	5,672	13,414	2,377	19,055	3,905	12,123	16,970	43,648	4,213
2004	18,912	707,674	16,116	9,306	47,142	9,425	4,014	6,525	3,361	9,847	50,169	64,751	5,644	13,756	2,355	19,256	3,951	12,156	17,392	43,531	4,038
2005	19,057	715,837	16,005	9,369	48,948	9,360	3,821	6,386	3,406	9,656	51,826	67,201	5,450	14,334	2,602	19,467	3,863	11,717	17,730	44,007	3,853
2006	19,154	727,474	15,864	9,361	51,172	9,196	3,823	6,451	3,435	9,715	54,170	69,434	5,316	15,040	2,735	19,725	3,802	11,337	18,207	44,261	3,746
2007	18,684	732,207	15,382	9,229	52,267	8,971	3,951	6,493	3,434	9,663	55,341	73,109	5,185	15,342	2,750	19,361	3,856	10,940	18,118	44,355	3,710
2008	18,885	747,982	15,359	9,369	54,621	9,033	3,963	6,856	3,462	9,730	57,667	76,518	5,279	16,115	2,905	19,695	4,032	11,147	18,707	45,150	3,645
2009	19,513	767,699	15,815	9,489	57,566	9,221	4,217	7,475	3,399	10,177	60,340	79,342	5,507	16,797	2,934	19,976	4,161	11,647	18,995	45,603	3,939
2010	19,572	796,464	16,411	10,057	54,479	9,503	4,462	7,741	3,549	10,167	64,993	82,481	5,581	16,408	3,243	20,526	4,252	11,869	19,990	45,994	4,147
2011	19,758	804,768	16,759	10,395	55,012	9,748	5,510	8,035	3,615	10,313	65,583	84,267	5,543	16,590	3,750	20,725	4,371	12,071	20,138	46,910	4,234
2012	19,767	815,285	16,604	10,284	56,249	10,022	6,552	8,924	3,636	10,336	67,059	86,785	5,729	17,131	4,487	20,667	4,513	11,871	20,287	47,263	4,214

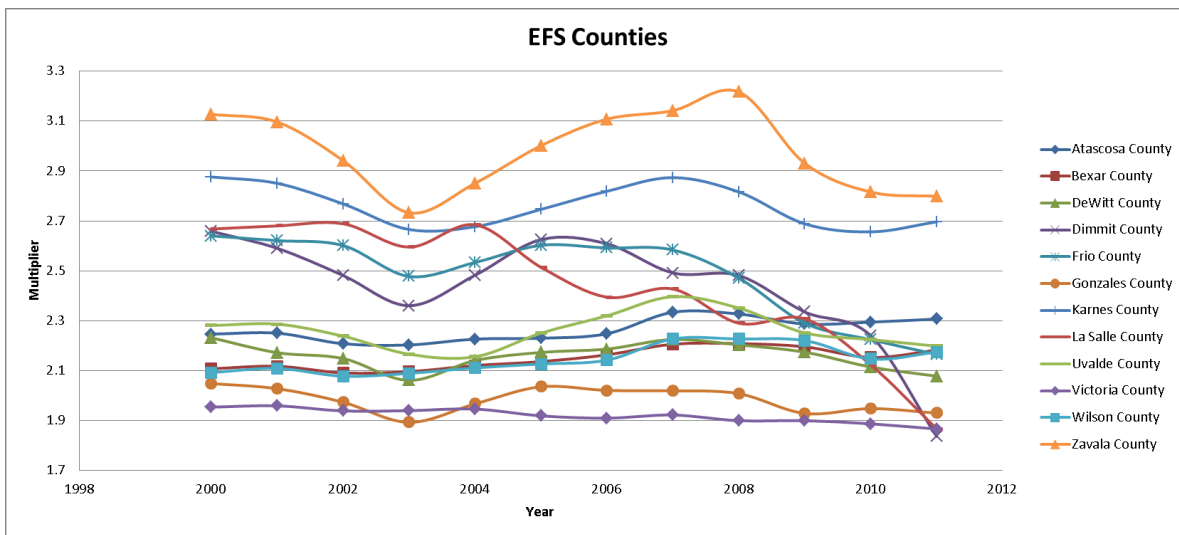
Result 2) TABLE 4, GRAPHS 6-7: The actual historical population and EMP numbers were used to calculate a persons-per-household (PHH) multiplier (Cai, 2007). These multipliers are lower, in general, than the standard Texas multiplier of 2.75 (USBC, 2011; Burchell, et al., 2006), but still illustrate the pattern of EMP to population. The dilution makes sense from the standpoint of more employment population to total population. De Witt, Dimmit, La Salle, Frio and Refugio counties show declining slopes; a downward trend in historic average PHH from the event period. The multipliers across the historic period were averaged to arrive at an average multiplier from which to project population related to SE (Zhou, 2013).

Table 4: 2000-2012 Population Multipliers; source: SARA Region L population forecast I EFS workforce analysis.xls

2000-2012 Population Multipliers															
County	2012	2011	2010	2009	2008	2007	2006	2005	2004	2003	2002	2001	2000	Average	WMA
Atascosa	2.35	2.31	2.29	2.29	2.33	2.33	2.25	2.23	2.23	2.20	2.21	2.25	2.25	2.27	2.29
Bexar	2.19	2.18	2.15	2.20	2.21	2.21	2.16	2.14	2.12	2.10	2.09	2.12	2.11	2.15	2.17
Caldwell	2.33	2.29	2.32	2.39	2.45	2.40	2.30	2.27	2.25	2.22	2.21	2.21	2.14	2.29	2.33
Calhoun	2.10	2.06	2.13	2.25	2.25	2.26	2.23	2.21	2.22	2.22	2.20	2.20	2.21	2.20	2.18
Comal	2.03	2.04	1.99	1.85	1.89	1.90	1.87	1.86	1.87	1.87	1.87	1.92	1.94	1.92	1.93
Dewitt	2.04	2.08	2.11	2.17	2.20	2.23	2.19	2.17	2.14	2.06	2.15	2.17	2.23	2.15	2.14
Dimmit	1.60	1.84	2.24	2.34	2.48	2.49	2.61	2.63	2.48	2.36	2.48	2.59	2.66	2.37	2.24
Frio	1.98	2.17	2.22	2.29	2.47	2.58	2.59	2.60	2.53	2.48	2.60	2.62	2.64	2.45	2.35
Goliad	2.02	2.00	2.03	2.11	2.07	2.08	2.07	2.08	2.10	2.10	2.10	2.12	2.08	2.07	2.06
Gonzales	1.94	1.93	1.95	1.93	2.01	2.02	2.02	2.04	1.97	1.89	1.97	2.03	2.05	1.98	1.97
Guadalupe	2.09	2.07	2.02	2.13	2.14	2.13	2.07	2.04	2.02	1.99	1.97	2.00	1.97	2.05	2.07
Hays	1.95	1.95	1.90	1.94	1.93	1.92	1.90	1.86	1.84	1.83	1.82	1.81	1.73	1.88	1.91
Karnes	2.66	2.70	2.66	2.69	2.82	2.87	2.82	2.75	2.68	2.67	2.77	2.85	2.88	2.75	2.73
Kendall	2.10	2.10	2.04	1.94	1.97	1.98	1.94	1.94	1.94	1.93	1.93	1.97	1.97	1.98	2.00
La Salle	1.58	1.87	2.12	2.31	2.29	2.43	2.39	2.51	2.68	2.60	2.69	2.68	2.67	2.37	2.21
Medina	2.26	2.24	2.24	2.28	2.29	2.30	2.23	2.21	2.20	2.18	2.18	2.20	2.19	2.23	2.25
Refugio	1.61	1.67	1.74	1.78	1.84	1.92	1.99	1.97	1.93	1.94	2.07	2.14	2.12	1.90	1.82
Uvalde	2.25	2.20	2.22	2.25	2.35	2.40	2.32	2.25	2.16	2.17	2.24	2.29	2.28	2.26	2.26
Victoria	1.89	1.87	1.89	1.90	1.90	1.92	1.91	1.92	1.95	1.94	1.94	1.96	1.95	1.92	1.90
Wilson	2.19	2.17	2.15	2.22	2.23	2.23	2.14	2.13	2.11	2.09	2.08	2.11	2.09	2.15	2.17
Zavala	2.84	2.80	2.82	2.93	3.22	3.14	3.11	3.00	2.85	2.73	2.94	3.10	3.13	2.97	2.94



Graph 4: 2000-2012 Region L Population Multipliers; source: SARA Region L population forecast I EFS workforce analysis.xls



Graph 5: 2000-2012 EFS County Population Multipliers; source: SARA Region L population forecast I EFS workforce analysis.xls

Result 3) TABLE 5, CHART 1: The percent change chart of the event period is interesting as EMP and population do not track closely, especially in outlying EFS counties. This is what we might expect if population moving into the region for work was not being accounted for in population enumeration.

Table 5: 2008-2012 Percent Change of Labor Force and Population; source: SARA Region L population forecast I EFS workforce analysis.xls

2008-2012 Percent Change of Labor Force and Population						
County	2008 LF	2012 LF	2008 POP	2012 POP	08-12 LF % change	08-12 POP % change
Atascosa	18,885	19,767	43,947	46,446	4.67%	5.69%
Bexar	747,982	815,285	1,651,709	1,785,704	9.00%	8.11%
Caldwell	15,359	16,604	37,671	38,734	8.11%	2.82%
Calhoun	9,369	10,284	21,127	21,609	9.77%	2.28%
Comal	54,621	56,249	103,272	114,384	2.98%	10.76%
Dewitt	9,033	10,022	19,902	20,465	10.95%	2.83%
Dimmit	3,963	6,552	9,833	10,461	65.33%	6.39%
Frio	6,856	8,924	16,939	17,702	30.16%	4.50%
Goliad	3,462	3,636	7,164	7,351	5.03%	2.61%
Gonzales	9,730	10,336	19,538	20,045	6.23%	2.59%
Guadalupe	57,667	67,059	123,398	139,841	16.29%	13.33%
Hays	76,518	86,785	147,674	168,990	13.42%	14.43%
Karnes	5,279	5,729	14,867	15,233	8.52%	2.46%
Kendall	16,115	17,131	31,754	35,956	6.30%	13.23%
La Salle	2,905	4,487	6,653	7,109	54.46%	6.85%
Medina	19,695	20,667	45,131	46,765	4.94%	3.62%
Refugio	4,032	4,513	7,430	7,259	11.93%	-2.30%
Uvalde	11,147	11,871	26,206	26,752	6.50%	2.08%
Victoria	45,150	47,263	85,762	89,269	4.68%	4.09%
Wilson	18,707	20,287	41,657	44,370	8.45%	6.51%
Zavala	3,645	4,214	11,725	11,961	15.61%	2.01%

In the chart below, the vast increase of labor force over population in percent change is illustrated by the blue bars.

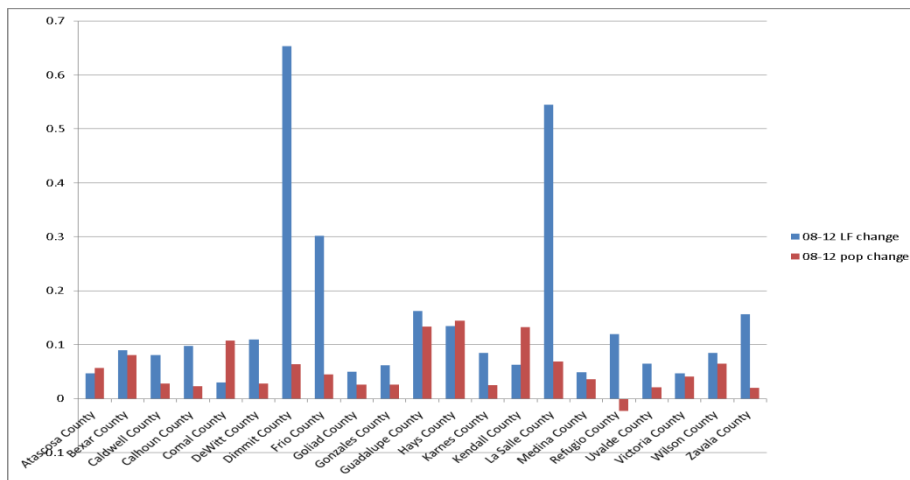


Chart 1: Percent Change of the Labor Force and Population 2008-2012; source: SARA Region L population forecast I EFS workforce analysis.xls

Result 4) TABLE 6, CHART 2: The table showing comparison of StDmg migration scenarios is color coded to show projected populations, with population based on EMP in yellow as lower in range, and

population in green as no difference in range, and red as higher in range. The chart of the comparisons illustrates those ranges. The set of historic period comparisons is shown first, then those for the event period follow.

Table 6: Historic Comparison of Labor Force and Population; source: SARA Region L population forecast I EFS workforce analysis.xls

Historic Comparison of Labor Force and Population							
County	Sdmg 0	Sdmg 0.5	Stdmg 1	AVE mult	WMA mult	POPx-Labor	POPx-WMA
Atascosa	59,053	75,481	87,117	2.2634987	2.2800125	72,962	73,494
Bexar	2,195,644	2,695,668	3,180,782	2.1481943	2.1655876	2,589,924	2,610,894
Caldwell	43,148	64,014	92,471	2.2882882	2.3244184	48,627	49,395
Calhoun	25,352	32,276	38,881	2.2040033	2.193817	23,253	23,146
Comal	112,457	192,808	317,376	1.9053531	1.9167259	223,647	224,982
DeWitt	22,003	22,216	21,770	2.1591629	2.1523812	28,339	28,250
Dimmit	14,414	12,825	10,042	2.4326242	2.3518445	16,031	15,499
Frio	22,136	24,488	26,160	2.4835487	2.4138857	22,194	21,571
Goliad	6,936	8,345	10,545	2.0787601	2.0670069	11,752	11,686
Gonzales	27,079	28,330	28,239	1.9833872	1.9730073	32,305	32,136
Guadalupe	145,771	258,289	424,870	2.0449329	2.0676093	257,535	260,391
Hays	237,144	474,802	952,790	1.8693767	1.9007691	338,242	343,922
Karnes	15,735	15,697	16,609	2.7611505	2.7427292	16,380	16,271
Kendall	33,669	56,429	90,187	1.9702415	1.9856462	66,646	67,167
La Salle	9,178	9,987	10,835	2.4367116	2.3155423	11,799	11,212
Medina	52,341	70,896	89,271	2.2283601	2.2443435	85,849	86,465
Refugio	8,793	8,119	6,888	1.9255835	1.8540823	12,510	12,045
Uvalde	37,440	36,257	31,631	2.259944	2.2621584	32,526	32,558
Victoria	111,013	109,785	101,747	1.9200871	1.9062078	115,176	114,343
Wilson	43,786	71,683	108,349	2.1454269	2.1665545	82,109	82,918
Zavala	19,410	17,521	13,540	2.9801887	2.9621085	6,398	6,359

Lower
Fall in
Higher

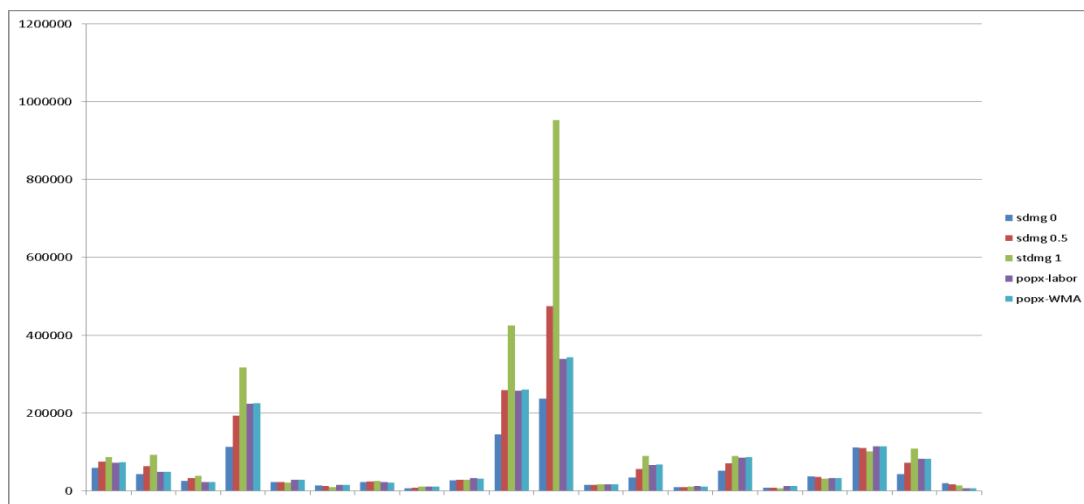


Chart 2: Historic Comparison of Labor Force and Population - State Demographer Scenarios and Employment; source: SARA Region L population forecast I EFS workforce analysis.xls\EMP-StDmg comparison

Result 5) FORECAST GRAPHS: The forecasts graphs of population projection based on EMP using the average multiplier for each county are shown in the first series of graphs. Some counties illustrate a historic bubble of positive upward slope, but the autoregressive method formula sees that as an outlier in relation to the overall historic period, it is smoothed away into a negative downward slope over time. As this does not reflect the current trends and rate of change, the counties were rerun using the event period plus one prior year for a second set of forecasts for population projection.

Table 7: Target Labor Population Projection; source: SARA Region L population forecast I EFS workforce analysis.xls/5 yr 13 yr emp-pop chart

2050 Target Labor Population Projection		
County	Event	Historic
Atascosa	63,054	72,962
Bexar	3,195,403	2,589,924
Caldwell	69,592	48,627
Calhoun	45,486	23,253
Comal	112,899	223,647
Dewitt	41,717	28,339
Dimmit	69,171	16,031
Frio	62,547	22,194
Goliad	11,927	11,752
Gonzales	30,586	32,305
Guadalupe	329,633	257,535
Hays	350,421	338,242
Karnes	25,308	16,380
Kendall	47,859	66,646
La Salle	42,850	11,799
Medina	69,863	85,849
Refugio	16,282	12,510
Uvalde	43,426	32,526
Victoria	130,049	115,176
Wilson	79,905	82,109
Zavala	37,238	6,398

Due to the large amount of county graph and table data, please see Appendix for forecast charts.

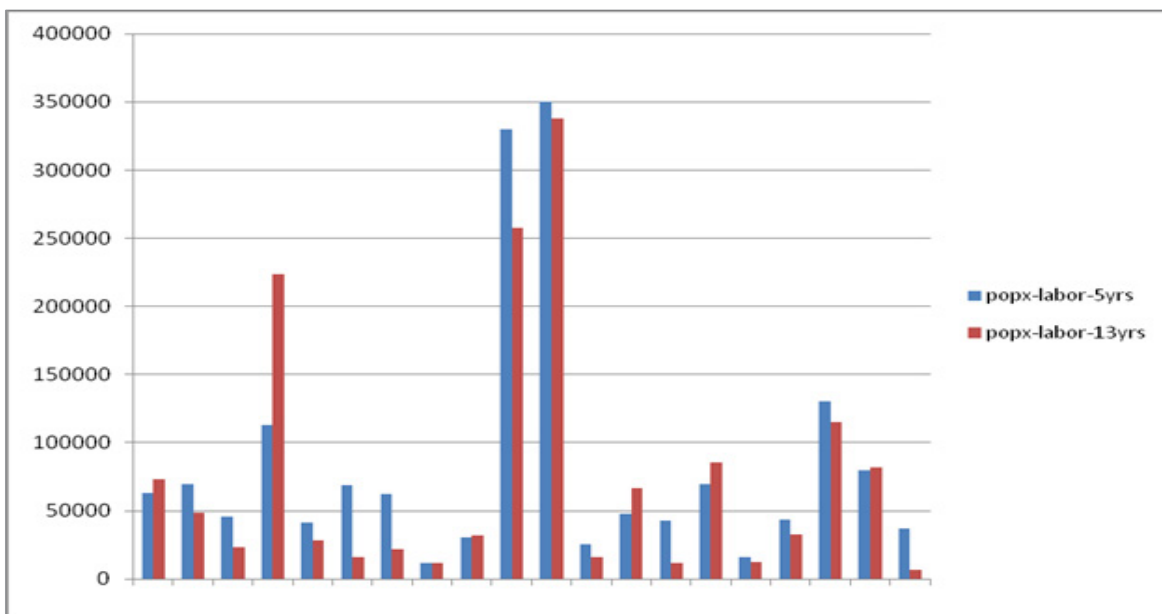


Chart 3: Comparison of Historic and Event Target Labor Population Projection; source: SARA Region L population forecast I EFS workforce analysis.xls

Result 6) TABLE 8, CHART 4: The comparison table and chart associated with the event period-based forecasts of population projection shows a third color code of red, for an SE-based population projection range that is higher than StDMg projections, in addition to the yellow (lower) and green (no difference) color keys.

Table 8: Event Comparison - State Demographer Scenarios and Employment; source: SARA Region L population forecast I EFS workforce analysis.xls

Event Comparison - State Demographer Scenarios and Employment				
County	Sdmg 0	Sdmg 0.5	Stdmg 1	POPx-Labor
Atascosa	59,053	75,481	87,117	63,054
Bexar	2,195,644	2,695,668	3,180,782	3,195,403
Caldwell	43,148	64,014	92,471	69,592
Calhoun	25,352	32,276	38,881	45,486
Comal	112,457	192,808	317,376	112,899
DeWitt	22,003	22,216	21,770	41,717
Dimmit	14,414	12,825	10,042	69,171
Frio	22,136	24,488	26,160	62,547
Goliad	6,936	8,345	10,545	11,927
Gonzales	27,079	28,330	28,239	30,586
Guadalupe	145,771	258,289	424,870	329,633
Hays	237,144	474,802	952,790	350,421
Karnes	15,735	15,697	16,609	25,308
Kendall	33,669	56,429	90,187	47,859
La Salle	9,178	9,987	10,835	42,850
Medina	52,341	70,896	89,271	69,863
Refugio	8,793	8,119	6,888	16,282
Uvalde	37,440	36,257	31,631	43,426
Victoria	111,013	109,785	101,747	130,049
Wilson	43,786	71,683	108,349	79,905
Zavala	19,410	17,521	13,540	37,238

	Lower
	Fall in
	Higher

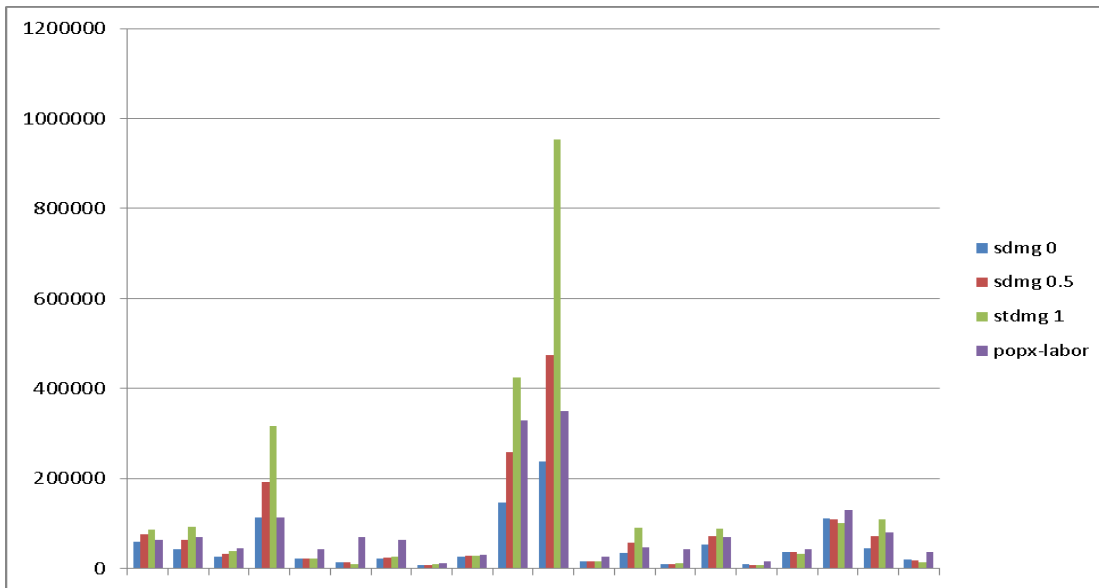


Chart 4: Event Comparison - State Demographer Scenarios and Employment; source: SARA Region L population forecast I EFS workforce analysis.xls

Result 7) Event FORECAST GRAPHS: The forecast graphs based on the event period show a series of trend lines where the “bubble” was not smoothed as an outlier, but used in the slope estimations.

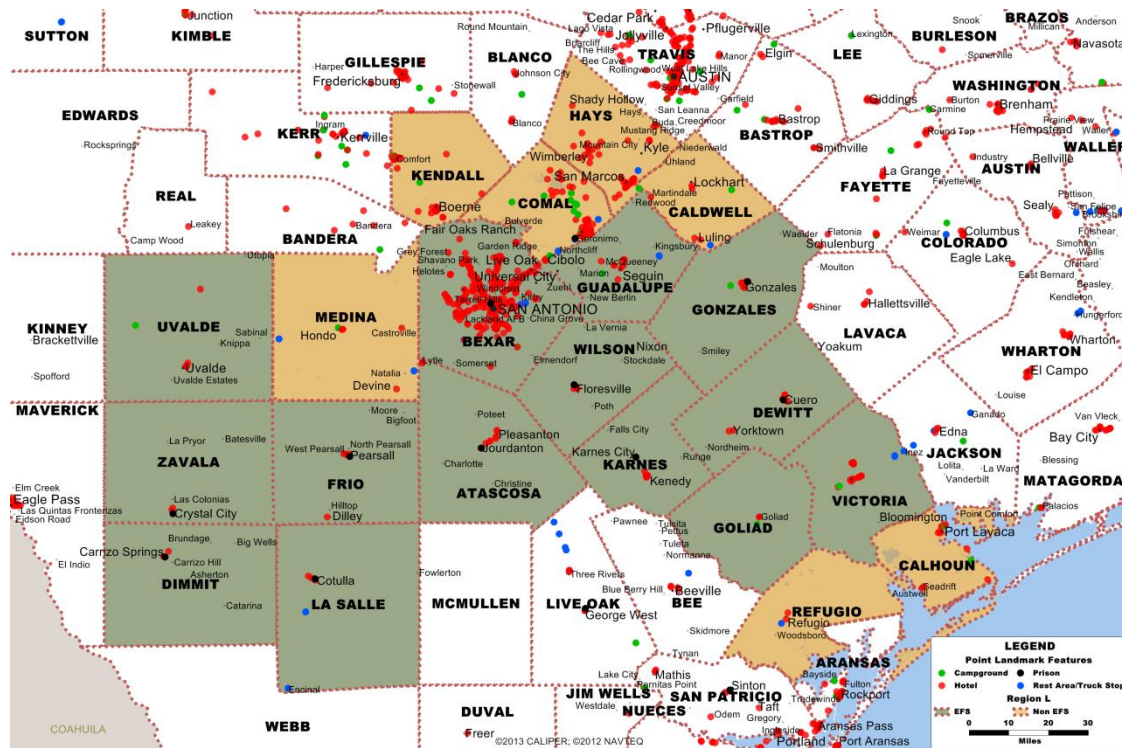
Due to the large amount of county graph and table data, please see Appendix for forecast charts.

Findings

De Witt, Dimmit, Goliad, Gonzales, La Salle, Refugio, and Victoria Counties all saw substantial differences in population projection target numbers based on employment for the historical period versus the StDmg projection scenarios. Bexar, Calhoun, De Witt, Dimmit, Frio, Goliad, Gonzales, Karnes, La Salle, Refugio, Uvalde, Victoria, and Zavala Counties all saw substantial differences in population projection target numbers based employment for the event period versus the StDmg projection scenarios.

Differences are very apparent in the map below, which shows the difference between population increase and employment increase. Purple shows more population officially counted than employment reported and green shows more employment reported than population officially counted. Dimmit, at the darkest green shows a vast difference in the percentage of the number of people reported working than of the number of officially counted population. Comal, on the other hand, shows a vast difference in the percentage of the number of officially counted population than of the number of people reported working. Bexar, Wilson, Guadalupe and Gonzales show reported employment and officially counted population with little percent differences, which would be expected if there was alignment between reported employment and officially counted population. Vivid color change points to the need for recount and a review of population data for that county.

Population Projection II – Housing Units



Map 9: Population Projection II - Housing Units; source: CCB GIS

Housing Units (HU)-Population multipliers are derived from models that cover population rate transitions over long periods of time. One aspect of this data type is that the object used for analysis is a building. Buildings go through a long life-cycle, including planning and construction (represented by building permit data). A building may be completed as long as a year after initial permits are awarded,¹⁴ movement of people in and out of the building, addressing, which is the domain of the United States Postal Service (USPS), and sometimes abandonment or use by temporary non-residents for undisclosed amounts of time is unknown. Ownership records are usually held at the county level for taxation purposes. As has been discussed previously, only permanent residential structures are counted in the census and commercial buildings that may house temporary visitors are not counted as part of census numbers. As RVs, man camps and other living quarters are not permanent, they are also not included in census counts.

Population transitions are modeled from consecutive phases that can generally each last 10-40 years.¹⁵ This can encompass the establishment of neighborhoods and other community designs. The equations for population multipliers take into account a variety of age-specific variables, such as groups moving into and out of childbearing age over time, and variables such as income and types of housing. It is assumed that residents normally live in buildings for periods lasting from six months to several years. During this time, residents themselves may undergo change. Phases of population transition include a growth phase, a

14 Smith, S. (1986). A Review and evaluation of the housing unit method of population estimation. *Journal of the American Statistical Association*, 81(394):287-295.

15 Chesnais, J. (June 1990). Demographic transition patterns and their impact on the age structure. *Population and Development Review*, 16(2).

stagnation phase, and a decline phase (Chesnais, 1990). Pre- and post- transition phases settle into average rates of population.

Communities also go through development stages. The punctuated population changes suspected in Region L and the curvilinear trajectories the researchers at the CCBR and elsewhere have documented in relation to extraction industry impacts seem similar to the classic population transition model. However, in the areas impacted by punctuated economic activity, the transition is accelerated and “normal” phases may be weighted by different rates of birth, mortality and migration activity, which reflects the behavioral profile of those populations. Housing demand in these circumstances often outpaces housing supply. This creates a rise in housing prices and make-shift housing, as well as increased commute times for those who cannot find housing.

Additional differences between the punctuated and the classic model are revealed in terms of time and influence. The duration and “movement” or shape of the phases is initially being seen in the Eagle Ford Shale region within a single decade, rather than each taking place over multiple decades. The change also is not strictly localized, but influences the region as a whole. Another difference is the layering of the sudden punctuated special population transition, on top of, and affecting, the longer-term permanent population transition.



Figure 20: Old Texan "Dog Run" House Log Cabin in Llano County, Texas; source: www.flickrriver.com

The population multiplier used in this section had to be derived from data that was not reflective of actual buildings. Because some counties do not have zoning, others do not report HU data, and most if not all residential buildings are privately owned, there is little incentive to either accurately count or reveal information about housing. While standard multipliers have been reported in another part of this study, the historic baseline counts of representative data types for employment and school enrollment have each been used to a baseline of historic population from which to compute a household size relative to that population characteristic.^{16 17} For housing units, however, a different baseline had to be established, due to the lack of reliable housing unit information. This baseline information was derived from a set of

¹⁶ Smith, S. (1986). A Review and Evaluation of the Housing Unit Method of Population Estimation. *Journal of the American Statistical Association*, 81 (394), 287-296.

¹⁷ Cai, Q., (2007). New Techniques in Small Area Population Estimates by Demographic Characteristics. *Population Research and Policy Review*, 26 (2), 203-218.

difference and ratio calculations in order to create a statistic from which to run projections. Therefore, the historic count for HU is not an actual count, but a statistical value related to housing unit-related data trends. This HU statistic gave projection data that fell within the ranges projected by the State Demographer and this study for all but two counties when tested for validity, which is deemed acceptable. The counties that showed issues had experienced severe downward trends in population that led to negative statistical values and therefore could not be used to calculate a projection in the auto-regressive method.

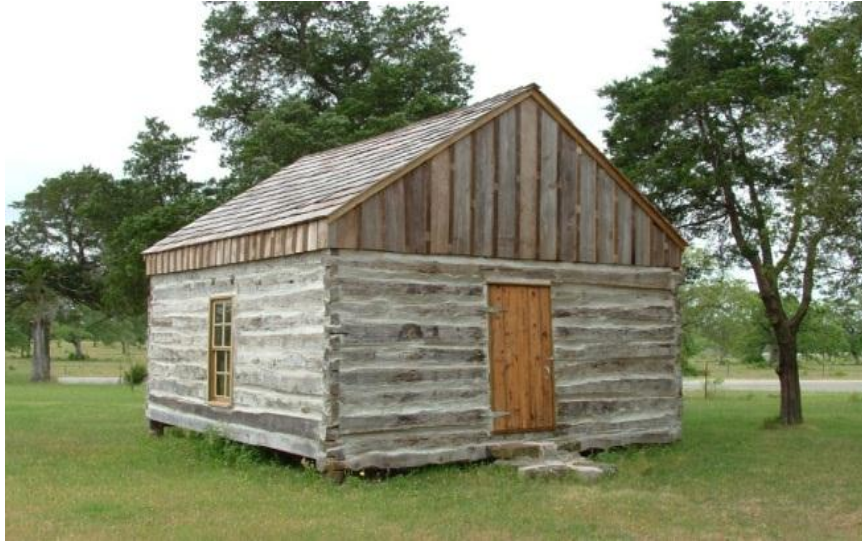


Figure 21: Wendish Pioneer Log Cabin in Serbin, Texas; source: [Wikimedia, Commonscommons.wikimedia.org](https://commons.wikimedia.org/wiki/File:Wendish_Pioneer_Log_Cabin_in_Serbin,_Texas.jpg)

The table below shows 2010 population density for the Region L counties, which is the average number of people per square mile of county area.

Population Density:

This measurement uses U.S. Census information on population and the county square mile area, to allow derivation of population density.

The formula is: $\text{population density} = \text{population} / \text{square mile area}$

Table 9: Historic Population Density 1990-2012; source: SARA Region L Population Forecast II Housing Units.xls

County blue is EFS+2	Square Mile Area	Population Density									
		1990		2000		2008		2010		2012	
		County Pop	Pop Density	County Pop	Pop Density	County Pop	Pop Density	County Pop	Pop Density	County Pop	Pop Density
Atascosa	1232.120253	30,533	24.78	38,628	31.35	43,947	35.67	44,911	36.45	46,446	37.70
Bexar	1246.824281	1,185,394	950.73	1,392,931	1,117.18	1,651,709	1,324.73	1,714,773	1,375.31	1,785,704	1,432.20
Caldwell	545.72625	26,392	48.36	32,194	58.99	37,671	69.03	38,066	69.75	38,734	70.98
Calhoun	512.314332	19,053	37.19	20,647	40.30	21,127	41.24	21,381	41.73	21,609	42.18
Comal	561.445706	51,832	92.32	78,021	138.96	103,272	183.94	108,472	193.20	114,384	203.73
DeWitt	909.181559	18,840	20.72	20,013	22.01	19,902	21.89	20,097	22.10	20,465	22.51
Dimmit	1330.91118	10,433	7.84	10,248	7.70	9,833	7.39	9,996	7.51	10,461	7.86
Frio	1133.022198	13,472	11.89	16,252	14.34	16,939	14.95	17,217	15.20	17,702	15.62
Goliad	853.518056	5,980	7.01	6,928	8.12	7,164	8.39	7,210	8.45	7,351	8.61
Gonzales	1067.749907	17,205	16.11	18,628	17.45	19,538	18.30	19,807	18.55	20,045	18.77
Guadalupe	711.141164	64,873	91.22	89,023	125.18	123,398	173.52	131,533	184.96	139,841	196.64
Hays	677.872325	65,614	96.79	97,589	143.96	147,674	217.85	157,107	231.76	168,990	249.29
Karnes	750.317191	12,455	16.60	15,446	20.59	14,867	19.81	14,824	19.76	15,233	20.30
Kendall	662.440782	14,589	22.02	23,743	35.84	31,754	47.93	33,410	50.43	35,956	54.28
La Salle	1488.848949	5,254	3.53	5,866	3.94	6,653	4.47	6,886	4.63	7,109	4.77
Medina	1327.761194	27,312	20.57	39,304	29.60	45,131	33.99	46,006	34.65	46,765	35.22
Refugio	770.207789	7,976	10.36	7,828	10.16	7,430	9.65	7,383	9.59	7,259	9.42
Uvalde	1556.547637	23,340	14.99	25,926	16.66	26,206	16.84	26,405	16.96	26,752	17.19
Victoria	882.504779	74,361	84.26	84,088	95.28	85,762	97.18	86,793	98.35	89,269	101.15
Wilson	806.985883	22,650	28.07	32,408	40.16	41,657	51.62	42,918	53.18	44,370	54.98
Zavala	1298.481257	12,162	9.37	11,600	8.93	11,725	9.03	11,677	8.99	11,961	9.21

According to researchers in demographic science, housing units can be a highly reliable measure from which to calculate population compared to other forms of data and formulas, from the standpoint of data quality and error characteristics.^{18 19} It is used at many levels of government and business for estimating population and is, “very useful for small area analysis; the HU method is used primarily for population estimates at the sub-county level” with a “higher proportion of small error and lower proportion of large error than census lists” (Smith, 1986, p287, 293-295).

Virtually everyone lives in some types of housing structure. . . Within the framework of [the HU] method, the population of any given geographic area is equal to the number of occupied housing units (households) times the average number of persons per household (PHH), plus the number of persons living in group quarters . . . This is an identity, not an estimate. If these three components were known exactly, the exact total population would also be known. The problem, of course, is that these components are almost never known exactly. They must be rather estimated from various data sources, using one or several different techniques. (Smith, p 287)

¹⁸ Smith, S. (1986). A Review and Evaluation of the Housing Unit Method of Population Estimation. Journal of the American Statistical Association, 81 (394), 287-296.

¹⁹ Ibid.

Two main approaches to HU data are the use of building permits (BP) and utility hook-ups, and each approach has its own negative aspects:

Building permits:

- are used in conjunction with occupation rates from the most recent census
- have a known time lag for construction before anyone can move in
- may not be issued in rural areas and small towns
- are not issued for mobile homes (MH) ; also the space where a MH is parked is not a home; due to the space and structure, there may be a double count; ownership and location can change
- may be issued for new construction or for structural repairs to an already established home.

Utility hook-ups:

- needs residential electricity customer lists that are current.²⁰

Other HU data such as phone, property tax and voter registration rolls, and USPS lists are often not current or may cover only part of the population. Another source of data, aerial photos have a problem with “seasonality and with how many dwelling units may be in a building”^{21 22} One of the tools this study used to identify populated areas was the photo database of Google Earth.

In this study, the data to assess housing units proved to have issues with validity and reliability, as discussed in other parts of this section. Therefore it was necessary to use statistical techniques to calculate HU-related values. As Smith states, “judgments must always be based on validity of data and assumptions used” related to HU data and changes in household trends sometimes go unnoticed” (Smith, 1986, p296). “Proportional” changes can be estimated, a “linear extrapolation of the trend in PHH between the two most recent censuses” can illustrate a trend, and regression can be used to relate PHH changes to other factors (Smith, 1986, p 290-291). Three methods that can be used with the PHH are: to decide on a constant, to allow each county its own trend, or to use a change ratio for the region, reflected by county-level changes (Cai, 2007). The U.S. Census methodology uses extrapolated averages to calculate multipliers, using change trends and a base number for HU (USBC, 2012).

Two error types that can be assessed in HU calculations are a precision measure of how close to census the estimates are, Mean Absolute Percentage Error (MAPE) which shows an average error if direction is ignored, and a bias measure of tendency toward estimates being high or low, Mean Algebraic Percentage Error (MALPE) which shows average error if direction is considered (Cai, 2007). Building activities can indicate migration, as shown in the table below.

Table 1 MAPEs and MALPEs for county population estimates by three forms of HU method and the CC method, 2000

Assumptions	MAPE	MALPE
HU1 1990 PPHU; 1990 GQ	4.7	-3.5
HU2 Extrapolating 1980–1990 PPHU trend for each county; 1990 GQ	6.7	-5.3
HU3 Tying 1980–1990 PPHU change ratio for the state to each county; 1990 GQ	4.8	-3.5
CC Building activities indicating migration	4.4	-3.3

MAPE mean absolute percentage error, *MALPE* mean algebraic percentage error

Figure 22: Example of technique and related errors; source: Cai, 2007, p.209

20 Ibid

21 Cai, Q., (2007). New Techniques in Small Area Population Estimates by Demographic Characteristics. Population Research and Policy Review, 26 (2), 203-218.

22 Smith, S. (1986). A Review and Evaluation of the Housing Unit Method of Population Estimation. Journal of the American Statistical Association, 81 (394), 287-296.

This study used a combination of these techniques to arrive at the HU-related values for the HU based population projections. As noted elsewhere in this document, research by Rutgers on population and housing units broke housing value and types (number of rooms per unit as well as number of dwellings per unit) to calculate multipliers and found that PHH varied in relation to value and income levels. That depth of analysis was not possible for this study, as valid and reliable initial data for housing units was not available (Burchell, et al., 2006). Therefore, this study looked at other studies for information on housing-to-population patterns in other areas where punctuated extraction industry activities have taken place.

A housing report performed by the and South-West Texas Border Small Business Development Center Network Rural Business Program in the University of Texas at San Antonio Institute for Economic Development and the UTSA Center for Urban and Regional Planning Research studied housing stock development related to Sector 21 workforce migration. A housing shortage was identified (Bangsund & Hodur, 2012, 2013). Researchers at North Dakota State University also identified housing shortages, and noted that as a constraint on growth. In North Dakota, unlike Texas, work sites must be shut down due to occasional life-threatening severe cold weather conditions and workers leave in order to survive, if they are unable to locate housing. Both sets of research found two types of “resident”—permanent and temporary. Issues related to housing include infrastructure pressure, such as roads, electricity, water and sewer, costs, and location (UTSA Center for Urban and Regional Planning Research, 2012; Hodur & Bangsund, 2012, 2013). A slide from a study of Williston, North Dakota shows the segments of housing and associated population estimated at the municipal and county level. “Service population” designates workers associated with Sector 21 direct and indirect activities.

Housing Model: 2012 Service Population	
Item	Number
Williston:	
Census Population , 2012	14,716
Hotels, Crew Camps, Condition Use Permits	3,592
Building Permits 2010-2012	7,041
Estimated Service Population Williston	25,349
Williams County:	
Census Population Williams County (excluding City of Williston)	7,882
Hotels, Crew Camps, Conditional Use Permits	15,232
Building Permits 2010-2012	1,057
Estimated Service Population Williams County (excluding Williston)	18,290
Total Estimated Service Population Williams County	49,320

Figure 23: Housing Model; source: Bangsund & Hodur, 2012

A 2012 news article by William Paack referred to a study by Source Strategies, a consulting firm used by the Texas Governor’s office for hotel industry information that revenues related to hotels had “highest gains in revenue . . . in oil and gas production areas . . . the top . . . procuring counties generated revenue gains . . . [that] amounted to one-third of the state’s total gain for 2011”.



Figure 24: RV Park Campground in Rio Bonito, Texas ; source: Cabin Rentals San Gabriel www.rbcabinresort.com

Information on Data used for housing units' analysis

There were many types of data sought for this section of the study; however quality of data generally was very bad. As data was either incomplete or non-existent, it was deemed unreliable and other data was not valid as it did not accurately reflect the value of a housing unit. The study used U.S. Census data to create a baseline for 1990, 2000 and 2010, then used the building permit (BP) data from the Texas A&M Real Estate Center at Texas A&M (<http://recenter.tamu.edu/>) in order to create a ratio of expected housing to counted housing. This difference ratio was used to derive a multiplier from historic population data. The range of the resulting PHH values was very large, from under 2 to over 12. However, in running checks between populations calculated from these BP-based PHH values, and comparing them against the historical population figures and the population projections made by the State Demographer, there was an alignment in the ranges across population totals from all the sources. However it is very important to note that the BP information represents an abstract statistical value only, and not an actual number. It must be stressed that the calculations used in this HU section are based on statistical computing, and not real counts.

Data sources are discussed below:

Building Permits from U.S. Census:

This information does not reflect the actual counts on the Region L counties. Some counties and municipalities do not have zoning or codes that require registration for the types of housing that would be tracked for residential or even hospitality and camping. Therefore, some counties have either very low numbers or register as “0” building permits. This data also only spans 2008-2011 for historical purposes, representing survey and not actual counts outside of the 2010 census year.

Table 10: Building Permits 2008-2011; source: SARA Region L Population Forecast II Housing Units.xls

Building Permits				
County	2008 Total	2009 Total	2010 Total	2011 Total
Atascosa	39	30	33	66
Bexar	3,316	3,437	2,964	2,150
Caldwell	48	15	10	12
Calhoun	86	60	43	65
Comal	1,221	471	490	1,016
Dewitt	0	0	7	4
Dimmit	5	7	5	0
Frio	6	12	2	0
Goliad	0	0	0	0
Gonzales	2	1	1	1
Guadalupe	958	813	868	647
Hays	1,295	411	773	513
Karnes	6	32	11	11
Kendall	79	57	113	115
La Salle	0	0	0	0
Medina	14	13	12	22
Refugio	2	7	2	1
Uvalde	26	19	10	21
Victoria	4	0	0	73
Wilson	25	27	20	12
Zavala	9	8	4	6

TAMU building permit data

This data is available from an online search at <http://recenter.tamu.edu/data/bp/> as “Building permit data for single-family, 2-4 family and 5-plus family units for states, metropolitan statistical areas (MSAs) and Texas counties.” It does not list whether the buildings have been built, how many apartments are in the multiple-unit structures, or whether they are purchased rented or vacant after being built. However, this was the only data source that had consistent data for consecutive years from which to calculate a historic base.

County Tax rolls and Municipal Building permit lists:

The researchers for this study attempted to collect property data from County Tax Assessor-Collectors with freedom of information requests (FOI), but data was either not sent, was sent as a list of all possible properties with no designation of residential versus other, or sent in the form of a link to an online data base, necessitating a one-at-a-time search of every property- if the researcher knew an address, owner or property number, which was not the case. Links to property searches also represented, for large municipalities, thousands to millions of records, as building permits do not designate the difference between a repair and a new construction, and properties are listed as just that- a list, with no order for type.

The table below shows data from county responses in yellow; non-responses are in pink and census numbers are shown by default. Some county data was sent from municipal representatives rather than from the county, and so, does not reflect information outside city limits in that county.

Table 11: Data for Building Permits; source: SARA Region L Population Forecast II Housing Units.xls

Data for Building Permits							
County	2008Total	2009Total	2010Total	2011Total	2012	2013	City or Source
Atascosa	39	30	33	66			Census numbers
Bexar							unreadable file*
Caldwell	236	189	153	348	287	59	Lockhart
Calhoun	602	684	742	811	805		Port Lavaca
Comal	1,221	471	490	1,016			Census numbers
Dewitt	0	0	7	4			Census numbers
Dimmit			67	66	57		Carrizo Springs partial; other in storage
Frio	119	157	164	167	187	33	Pearsall
Goliad	0	0	0	36	51	9	Goliad
Gonzales	2	1	1	1			Census numbers
Guadalupe	2,386	2,121	2,592	2,364	2,162	505	Seguin
Hays	1,295	411	773	513			Census numbers
Karnes	21	34	39	305	269	88	Karnes City
Kendall	1,499	1,288	1,573	1,631	1,528	288	Boerne
La Salle	0	0	0	0			Census numbers
Medina	785	824	665	634	575	146	Hondo
Refugio	5	0	1	1	5	0	County Judge
Uvalde	26	19	10	21			Census numbers
Victoria			3,308	3,233	4,013		Victoria
Wilson	25	27	20	12			Census numbers
Zavala	9	8	4	6			Census numbers

Note: All permit data includes commercial, residential and repair

Some county data is from individual cities and does not represent the entire county

*SA sent link to DB search; Live Oak data proprietary file format (unreadable)

Voter Registration:

Voter registration numbers came from the Texas Secretary of State (<http://www.sos.state.tx.us/elections/historical/vrfig.shtml>) and were listed by type for the months of January, March, and November in each year, 2008-2012. The types classified the voter records by precinct and as “suspense”, which means possible association with a new address; renewal not processed by voter, “non-suspense”, and “total”. For this study totals from November were used.

There was a general decline until 2012, when it showed a general increase, which may reflect voting for the US presidential election. As registration requires individuals to associate with a physical residential address, it is likely that registered voters are permanent residents. These numbers can be used as a stability check on population percent growth, as transitory population would either not be able to register due to lack of permanent address, or not vote because they are mobile and have moved to a different living arrangement and work site.

Table 12: Voter Registration data; source: SARA Region L Population Forecast II Housing Units.xls

Voter Registration Data					
County	2008nov	2009nov	2010nov	2011nov	2012nov
Atascosa	24,557	23,385	23,620	23,253	24,213
Bexar	931,118	885,138	905,859	859,882	918,552
Caldwell	21,265	20,061	20,709	19,556	20,791
Calhoun	13,096	12,595	12,707	12,074	12,511
Comal	73,281	70,804	73,750	73,246	78,543
Dewitt	12,324	11,875	11,866	11,615	11,943
Dimmit	7,487	7,094	7,262	6,786	6,963
Frio	10,528	9,740	9,968	9,983	10,368
Goliad	5,694	5,402	5,553	5,383	5,514
Gonzales	12,424	12,253	12,663	12,333	12,438
Guadalupe	73,892	72,194	74,783	73,668	79,474
Hays	97,390	92,654	98,210	95,014	103,491
Karnes	8,121	7,832	7,873	7,537	7,831
Kendall	23,704	23,469	24,470	24,356	25,711
La Salle	4,122	3,870	4,043	3,868	4,002
Medina	26,613	25,752	26,405	25,888	27,315
Refugio	5,540	5,308	5,348	5,066	5,165
Uvalde	16,506	15,959	16,315	15,738	16,194
Victoria	53,404	51,275	51,832	49,489	51,501
Wilson	26,752	26,169	26,812	26,397	27,902
Zavala	8,124	7,916	8,396	8,189	8,566
Grand Total	13,575,062	12,952,562	13,269,233	12,841,808	13,646,226

United States Postal Service

A FOI request was made to The USPS for a listing of county residential address totals, as USPS has jurisdiction for official addressing and provides the address list for the U.S Census count activities. A response letter was received, but data was not received at the time of this study.



Figure 25: Mailbox at Old Magnolia Town in Palestine, Texas; source: www.flickr.com



Figure 26: Historical Marker - Old Gilmer Hotel in Rockspings, Texas; source: www.flickr.com

Hotel Number of Rooms and Occupancy Rates:

Lodging that lasts for longer than 30 days is not subject to the State hospitality tax and can be used with sales tax and occupancy rate data to calculate general estimate differences for short term and long term lodgers. However, such numbers do not track whether lodgers are repeat or unique and how long stays are (Coburn 2007; Texas Comptroller of Public Accounts, 2013). Data from the State Comptroller's Office and the Governor's office (which used an outsourced consulting firm, Source Strategies, for their figures) provided total numbers of rooms and occupancy rate for 2007-2012 (TCoPA, 2013; Office of the Governor, 2011). From these numbers, percent change from year to year for occupancy across 2007-2012 was calculated. The cells that are green show an annual increase of at least 25% in change of number of rooms used.

Table 13: Percent Change in Number of Rooms used 2007-2012; source: SARA Region L Population Forecast II Housing Units.xls

Percentage Change in Number of Rooms Used from 2007-2012											
County	2007	2008	07-08 % change	2009	08-09 % change	2010	09-10 % change	2011	10-11 % change	2012	11-12 % change
Atascosa	85	93	0.09	137	0.47	181	0.32	265	0.47	315	0.19
Bexar	20,095	20,882	0.04	19,051	-0.09	22,306	0.17	23,638	0.06	21,377	-0.10
Caldwell	80	82	0.03	71	-0.13	104	0.46	104	0.00	98	-0.06
Calhoun	272	304	0.12	258	-0.15	300	0.16	310	0.03	374	0.21
Comal	1,035	1,129	0.09	1,046	-0.07	1,265	0.21	1,365	0.08	1,077	-0.21
Dewitt	74	85	0.15	49	-0.42	134	1.72	170	0.27	207	0.21
Dimmit	57	69	0.20	68	0.00	96	0.41	104	0.09	391	2.75
Frio	74	98	0.33	121	0.22	151	0.25	209	0.39	337	0.62
Goliad	27	30	0.10	16	-0.45	28	0.67	49	0.79	76	0.54
Gonzales	50	49	-0.01	72	0.45	113	0.57	140	0.24	185	0.32
Guadalupe	397	392	-0.01	438	0.12	573	0.31	693	0.21	587	-0.15
Hays	921	942	0.02	1,085	0.15	1,200	0.11	1,306	0.09	1,359	0.04
Karnes	47	58	0.24	52	-0.10	66	0.26	115	0.75	315	1.74
Kendall	230	265	0.15	260	-0.02	280	0.07	288	0.03	337	0.17
La Salle	47	55	0.18	69	0.26	115	0.67	107	-0.07	326	2.05
Medina	112	109	-0.02	96	-0.12	148	0.54	183	0.24	130	-0.29
Refugio	49	47	-0.05	44	-0.06	49	0.12	66	0.34	54	-0.17
Uvalde	312	340	0.09	320	-0.06	394	0.23	430	0.09	293	-0.32
Victoria	775	789	0.02	624	-0.21	759	0.22	1,016	0.34	978	-0.04
Wilson	27	30	0.10	30	0.00	44	0.46	65	0.48	141	1.16
Zavala	25	30	0.23	33	0.09	58	0.76	74	0.28	44	-0.41

Note: the green highlighted part shows an increase over 25%

For the percent change across the event period, both room number total and number of rooms used was tallied and that information is in the table below. Large increases illustrate some of the housing pressure being felt by EFS areas.

Table 14: Percent change Number of Rooms Used and Total; source: SARA Region L Population Forecast II Housing Units.xls

Percent Change in Number of Rooms Used and Total				
County	# Rooms Used 07-12		# Rooms Total 07-12	
	2007-2012	% change 07-12	2007-2012	% change 07-12
Atascosa	230	2.71	280	2.04
Bexar	1,282	0.06	7,544	0.24
Caldwell	18	0.23	30	0.20
Calhoun	102	0.38	103	0.18
Comal	42	0.04	582	0.28
Dewitt	133	1.79	153	1.32
Dimmit	334	5.81	377	3.17
Frio	263	3.55	345	2.56
Goliad	49	1.78	42	0.71
Gonzales	135	2.72	138	1.53
Guadalupe	190	0.48	273	0.40
Hays	438	0.48	818	0.53
Karnes	269	5.77	345	4.26
Kendall	107	0.47	170	0.35
La Salle	280	6.00	309	3.59
Medina	18	0.16	15	0.06
Refugio	5	0.11	-10	-0.10
Uvalde	-19	-0.06	-22	-0.03
Victoria	203	0.26	2	0.00
Wilson	114	4.16	146	3.48
Zavala	19	0.77	39	0.83

Note: yellow highlights note percent change



Figure 27: New Resident Information - City of Oviedo, Florida; source: www.cityofoviedo.net

Utility hookups:

ERCOT utility hook-up records, which can serve as a proxy for new residential counts, were sought, but ERCOT only proved total state data by month, not county data. Utilities contacted for counts of residential billing did not respond.



Figure 28: RV Travel 363; source: www.rvtravel.com

Apartments:

Directories of hotels, apartments, the Texas Apartment Association (TAA), and other listings were collected and researchers attempted to call, email and search online for information. However, most businesses answered that they did not know anything about their room numbers and occupancy or did not answer the phone or emails. There was no response from the TAA.

TWDB provided a spreadsheet of data that included hotel occupancy rates and hotel rooms sold, U.S Census population, and number of manufactured homes sold 2010-2012, among other data (available on request from TWDB). The manufactured home data and its source are shown below. This data is for new homes only and does not list mobile homes already in place. A percent change between years that was over 50% is highlighted. It is not known whether these are part of man camps or were placed by individuals, whether they have people living in them, or whether they have been moved.

Mobile Homes

Mobile home sales data was available from State records, however these records do not track whether the homes are occupied, moved, or where they are located. Sales were registered in the county of sale.

Table 15: Percent Change Manufactured Home Sales 2010-2012; source: Texas Department of Housing & Community Affairs - Manufactured Housing Division, Manufactured Housing Report: SARA Region L Population Forecast II Housing Units.xls

Percent Change of Manufactured Home Sales 2010-2012					
Installed County	2010	2011	2012	2010-2011 % change	2011-2012 % change
Atascosa	246	371	233	0.51	-0.37
Bexar	593	561	510	-0.05	-0.09
Caldwell	57	46	63	-0.19	0.37
Calhoun	26	11	11	-0.58	0.00
Dewitt	69	59	35	-0.14	-0.41
Dimmit	46	146	235	2.17	0.61
Frio	38	77	152	1.03	0.97
Goliad	13	16	16	0.23	0.00
Gonzales	30	28	57	-0.07	1.04
Guadalupe	117	118	105	0.01	-0.11
Hays	145	134	116	-0.08	-0.13
Karnes	24	40	90	0.67	1.25
Kendall	23	26	22	0.13	-0.15
La Salle	34	77	75	1.26	-0.03
Medina	92	80	68	-0.13	-0.15
Refugio	11	9	7	-0.18	-0.22
Uvalde	35	21	22	-0.40	0.05
Victoria	95	354	179	2.73	-0.49
Wilson	80	75	97	-0.06	0.29
Zavala	38	20	40	-0.47	1.00

Note: number of manufactured home sales

Man Camps

Man camps are organized parcels of housing that are often put up by companies that need to house workers, due to a lack of conventional housing. There are strict rules for behavior, such as no alcohol. There are areas for lounging, for entertainment, and for other amenities are often provided.

9 out of 20 Man-camps, contacted from a list pulled from an Eagle Ford Shale housing listing on eaglefordshale.com, a prominent resource website for the area, reported a total of 1543 units. Some which had no information listed either did not answer the phone, reply to a message left, or would not give any information. Some of the units consist of 2-bed rooms, which would allow for bunking up. Other sources for RV parks and temporary camping were searched for on Travel.state.tx.us.



Figure 29: Example of Man Camp - Sendero Ranch in Dilley, TX; source: <http://eaglefordshale.com/press-releases/new-eagle-ford-workforce-housing-coming-press-release>, Feb 4, 2013

Table 16: Partial Listing of Man Camps in EFS Area; source: SARA Region L Population Forecast II Housing Units.xls

Partial Listing of Man Camps in the EFS Area					
County	Man Camp #	Man Camp	Location	County	# Rooms
Atascosa	2 camps	Atascosa Square Bar M RV Park	Jourdanton Pleasanton	Atascosa Atascosa	
Bexar	0				
Caldwell	0				
Calhoun	0				
Comal	0				
Dewitt	0				
Dimmit	2012-2013 (5 camps)	The Studios at Carrizo Springs Mesquite Logistics Carrizo Springs Lodge Cotton Lodge at Carrizo Springs Eagle's Den	Carrizo Springs Carrizo Springs Carrizo Springs Carrizo Springs Carrizo Springs	Dimmit Dimmit Dimmit Dimmit Dimmit	483 122 22 108
Frio	2012-2013 (3 camps)	Eagle Ford Village Sendero Ranch Sendero Ranch	Dilley Dilley Pearsall	Frio Frio Frio	170 190
Goliad	0				
Gonzales	0				
Guadalupe	0				
Hays	0				
Karnes	2012-2013 2 camp)	South Boots Hill Frontier Oasis	Karnes City Kenedy	Karnes Karnes	112
Kendall	0				
La Salle	2012-2013 (5 camps)	Eagle Ford Cabins Eagle's Den La Salle Lodging Artemis One Cotulla Village	Cotulla Cotulla Cotulla Carrizo Springs Cotulla	La Salle La Salle La Salle La Salle La Salle	216 120
Medina	0				
Refugio	0				
Uvalde					
Victoria	2012-2013 (1 camp)	Coletto Creek Cabins	Victoria	Victoria	
Wilson	0				
Zavala	1 camp	Double C Resort	Crystal City	Zavala	

Note: Total reports units = 1543 from 9 of 20 known camps

Reported Numbers
0 Means no data
(Camp Number) From online listing



Figure 30: Texas Log Cabin and RV Park Review in Canton, TX; source: www.rvparks.org

Summary of housing unit data and methods used for analysis

Housing unit data was problematic. Data could include residential housing and types reflecting how many living or dwelling units were in each structure, hotels and other types of temporary housing that is known to be used by the overflow of population to the area, relational information such as utility hook-ups, taxing body and postal property address listings, and other forms of enumeration commonly collected at local, state and federal levels. However, many small localities did not have computerized records and needed time for clerks to pore through big dusty volumes or lists not designed for tabulation. Government sources many times had data that only reflected one aspect of the total housing topic, or had data that was incomplete due to issues with local records and other administrative technicalities. Government data at the state and federal levels was often in incremental, sampled or state level formats, without consecutive periods or fine grained breakouts for localities. Some records reflected market interests and reported economic aspects and not basic descriptive factors and categories. Data such as sale tax receipts for lodging showed overall percentages, but not seasonal activity or types of taxable sales. Private and business data was either missing or unreported. Many businesses contacted declined to interact with staff researchers for this study or said they didn't know information such as number of rooms and percent of long-term lodgers, which is unfortunate as such data has the potential to serve regional business purposes as much as it will be used for policy and planning. The only data source that appeared valid, reliable and stretched over consecutive years was building permit (BP) data for new residential units from the Texas A&M Real Estate Center. A portal search there allowed access to county data from 1990 to the present. The data source is located at: <http://recenter.tamu.edu/data/bp>. Still, sourced from U.S Census data, many counties showed missing data due to a lack of local reporting systems or zoning that required issuance of permits.

Building permits are not structures and there was no way to trace whether permits led to an actual building, what time in which that may have occurred, or whether one or more sets of residents inhabited possible structures. Therefore, staff formulated a calculation for a statistical value to use for comparison. Based off of methodology in demographic science that uses reference points from some types of data for calculations, the historic TAMU BP data and historical census population data sets were used for these calculations. A sum of permits was used to establish a historic trend for the autoregressive method. The difference in population across the historical period was divided by the BP sum and a multiplier calculated. This was used to calculate a 2050 target value for the population projection based on building

permits. The resulting population number targets generally fell within the expected range. Exceptions were some counties that either had no building permit data or had declining population over the historical period and so, a negative value that could not be used in the calculation. These counties were Dimmit, Goliad, La Salle, Refugio and Zavala.

Because this data was based on a statistical value, it was not possible to calculate a percent change over an event period or to run an autoregressive method from the single statistical value. So, the data on voter registration from the Texas Secretary of State, available from 2008-2012, was run for event-based analysis. This data was problematic, as it represented a subset of population that traditionally is established (voter registration is tied to a permanent address), older, and politically interested. In Texas, for the 2012 presidential election, roughly 43% of the voting-aged-public (VAP) voted, with 74% of the VAP registered (Texas Secretary of State, ND). Declining numbers reported for the 2008 presidential election reflect the declining number for Region L county voting rolls, despite mild increases of registered voters every two years in major election cycles. Secretary of State numbers on participation, of course, are state wide, and do not necessarily reflect voting activity in the EFS region. However, it is safe to say that as registered voters move, fail to renew, and new potential voters do not take their place, the pattern seen in Region L counties of a steady decline in registered voters is a trend. It is unlikely to expect that temporary workers in the area, without permanent local addresses, have pursued registering to vote in the Region L locale wherein they work. Running voter registration data from multipliers for projections revealed patterns of decline and yielded very wide confidence intervals. The results from that data were deemed generally invalid for use to project population. An example for Hays County is shown below; Hays is a county that has demonstrated with other data a steep positive linear slope with a very tight confidence interval. The figure here, based on voter registration data, shows a positive slope but one that is not steep and the confidence interval is extremely wide. Data run from other historically low population and high population counties exhibited similar non-regular results. This signals that analysis using the voter registration data was not suitable for population projection calculations related to housing units.

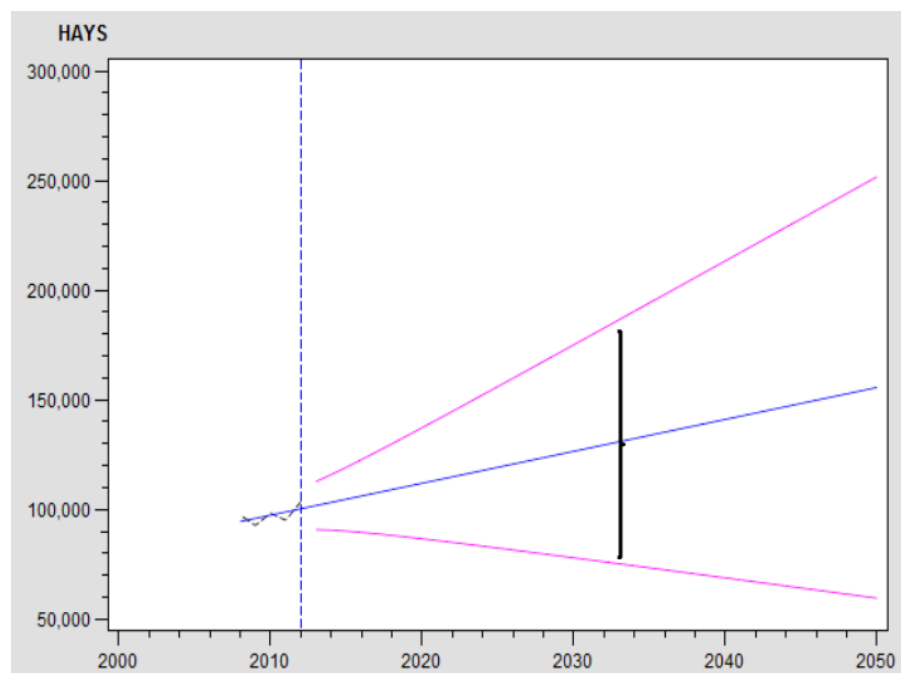


Figure 31: Sample of Population Projection based on Voter Registration in Hays County; source: SARA Region L Population Forecast II Housing Units.xls\sample graph VR-Hays

Results

The findings for population projections based on the data relative to the historic period shows variation across counties. County findings are summarized in the discussion section of this study.

Result 1) Historic count data

Result 2) PHH multiplier

Result 3) Percent change

Result 4) Historic Comparison of Data-based and StDmg population projections

Result 5) Historic County Forecast charts, see XLS

Result 6) Event Comparison of Data-based and StDmg population projections

Result 7) Event County Forecast charts, see XLS

Data for Housing Unit calculations were analyzed and is illustrated as follows

Result 1) TABLE 17-18: Historic counts per year, per county, were graphed to show movement over time. Building permit data showed a general increase over time. These are listed in the table below.

Table 17: Table of BP Difference Totals; source: SARA Region L Population Forecast II Housing Units.xls\TAMU BP totals 1990-2011

		Table of Building Permits Difference Totals																			
Date	Atascosa	Bexar	Caldwell	Calhoun	Comal	Dewitt	Dimmit	Frio	Goliad	Gonzales	Guadalupe	Hays	Karnes	Kendall	La Salle	Medina	Refugio	Uvalde	Victoria	Wilson	Zavala
1990	24	1,487	8	39	209	5	6	17	62	9	53	18	0	78	0	21	1	13	107	17	0
1991	54	1,713	7	92	252	5	7	15	23	8	47	21	3	144	0	18	8	8	129	25	0
1992	47	3,123	9	113	427	7	57	88	7	9	144	22	5	358	0	76	41	14	161	15	12
1993	74	5,178	24	34	635	8	11	15	10	5	261	53	10	212	0	39	0	18	185	17	0
1994	49	8,072	39	49	1,064	8	6	12	8	3	135	85	5	251	0	146	1	45	202	22	9
1995	45	6,985	61	71	885	11	1	15	1	4	392	508	4	192	0	39	1	44	172	17	6
1996	58	7,986	76	148	1,028	13	10	17	1	7	613	607	11	247	0	45	5	25	174	15	28
1997	49	6,930	133	49	1,289	6	4	25	0	7	770	537	9	281	0	44	4	18	349	18	16
1998	53	8,006	57	48	896	16	8	28	0	8	651	684	1	367	0	38	11	25	536	9	16
1999	45	12,124	81	55	946	29	9	27	0	47	628	1,010	15	427	0	35	2	30	198	7	18
2000	66	8,978	57	68	1,132	10	0	15	0	3	473	1,724	2	278	1	35	1	31	167	11	4
2001	49	10,919	217	80	1,204	42	25	12	0	4	483	1,253	3	349	0	33	4	25	144	97	5
2002	73	10,432	112	111	1,492	2	12	8	0	20	809	1,502	13	373	1	21	37	41	212	51	6
2003	81	9,747	122	127	1,747	8	14	7	0	9	1,127	1,478	18	544	0	104	5	41	117	29	3
2004	72	13,320	103	155	1,840	5	15	81	0	4	1,552	2,578	26	599	2	111	12	24	398	45	3
2005	68	17,808	84	118	2,205	5	15	19	0	9	1,533	2,655	8	552	3	43	12	39	123	44	3
2006	119	15,011	84	96	2,477	6	7	20	0	8	1,406	2,518	8	675	49	31	7	41	143	40	3
2007	71	9,504	30	84	1,856	5	14	11	0	6	1,232	1,975	44	533	15	43	5	28	103	54	31
2008	41	8,119	49	86	1,221	5	5	6	0	2	958	2,081	30	193	10	17	3	26	59	25	9
2009	32	4,015	116	60	826	0	7	12	0	1	813	1,390	51	148	6	30	8	28	46	59	8
2010	36	4,653	39	56	846	7	5	11	0	1	1,055	2,380	25	202	6	12	3	12	47	61	4
2011	68	4,961	12	65	1,016	4	5	11	0	1	823	2,474	24	204	6	22	2	146	83	32	6

Table 18: Historic Building Permits Numbers; source: SARA Region L Population Forecast II Housing Units.xls\TAMU Building Permits Hist cnts

Year	Historic Building Permit Numbers															
	Atascosa	Bexar	Caldwell	Calhoun	Comal	DeWitt	Frio	Gonzales	Guadalupe	Hays	Karnes	Kendall	Medina	Uvalde	Victoria	Wilson
1991	54	1,713	7	92	252	5	15	8	47	21	3	144	18	18	129	25
1992	101	4,836	16	205	679	12	103	17	191	43	8	502	94	94	290	40
1993	175	10,014	40	239	1,314	20	118	22	452	96	18	714	133	133	475	57
1994	224	18,086	79	288	2,378	28	130	25	587	181	23	965	279	279	677	79
1995	269	25,071	140	359	3,263	39	145	29	979	689	27	1,157	318	318	849	96
1996	327	33,057	216	507	4,291	52	162	36	1,592	1,296	38	1,404	363	363	1,023	111
1997	376	39,987	349	556	5,580	58	187	43	2,362	1,833	47	1,685	407	407	1,372	129
1998	429	47,993	406	604	6,476	74	215	51	3,013	2,517	48	2,052	445	445	1,908	138
1999	474	60,117	487	659	7,422	103	242	98	3,641	3,527	63	2,479	480	480	2,106	145
2000	540	69,095	544	727	8,554	113	257	101	4,114	5,251	65	2,757	515	515	2,273	156
2001	589	80,014	761	807	9,758	155	269	105	4,597	6,504	68	3,106	548	548	2,417	253
2002	662	90,446	873	918	11,250	157	277	125	5,406	8,006	81	3,479	569	569	2,629	304
2003	743	100,193	995	1,045	12,997	165	284	134	6,533	9,484	99	4,023	673	673	2,746	333
2004	815	113,513	1,098	1,200	14,837	170	365	138	8,085	12,062	125	4,622	784	784	3,144	378
2005	883	131,321	1,182	1,318	17,042	175	384	147	9,618	14,717	133	5,174	827	827	3,267	422
2006	1,002	146,332	1,266	1,414	19,519	181	404	155	11,024	17,235	141	5,849	858	858	3,410	462
2007	1,073	155,836	1,296	1,498	21,375	186	415	161	12,256	19,210	185	6,382	901	901	3,513	516
2008	1,114	163,955	1,345	1,584	22,596	191	421	163	13,214	21,291	215	6,575	918	918	3,572	541
2009	1,146	167,970	1,461	1,644	23,422	191	433	164	14,027	22,681	266	6,723	948	948	3,618	600
2010	1,182	172,623	1,500	1,700	24,268	198	444	165	15,082	25,061	291	6,925	960	960	3,665	661
2011	1,250	177,584	1,512	1,765	25,284	202	455	166	15,905	27,535	315	7,129	982	982	3,748	693

Note: All the numbers indicate the building permits after 1990.

Result 2) TABLE 19: The actual historical population and BP-HU-related numbers were used to calculate a persons-per-household (PHH) multiplier (Cai, 2007). These multipliers vary from the standard Texas multiplier of 2.75 (USBC, 2012; Burchell, et al., 2006), but still reflects general trends for population. Dimmit, Goliad, La Salle, Refugio and Zavala multipliers are missing due to either missing data or negative values in the formula used to calculate the multiplier.

Table 19: Multipliers based from TAMU Building Permit data; CCBR

Multiplier based on TAMU Building Permits Data			
County	BP mult	Xdata	2050 POP
Bexar	3.21402266		3010225
Atascosa	12.0368		74791
Caldwell	7.96957672		66573
Calhoun	1.35354108		26114
Comal	2.37822338		238300
Dewitt	7.0049505		23500
Dimmit		-315	
Frio	8.63296703		24724
Goliad		0	
Gonzales	16.2590361		26217
Guadalupe	4.45671173		279011
Hays	3.57494098		353057
Karnes	7.90793651		18902
Kendall	2.83237481		77549
La Salle		1747	
Medina	19.404277		84769
Refugio		0	
Uvalde	4.50634697		36683
Victoria	3.51760939		116413
Wilson	30.5036075		83081
Zavala		0	

Result 3): There is no percent change table or chart of the event period for this HU, as the only usable data for HU was a single statistical value per county.

Result 4) TABLE 20, CHART 5: The table showing comparison of StDmg migration scenarios with BP-HU is color coded to show projected populations, with population based on HU in yellow being lower in range, population in green as no difference in range, and population that is higher in red. Missing data is white. The chart of the comparisons illustrates those ranges.

Table 20: Comparison of State Demographer Scenarios to BP based Population Projection, source: SARA Region L Population Forecast II Housing Units.xls\hist stdmg BPHU compares

Comparison of State Demographer Scenarios to BP Population Projection					
County	StDmg 0	StDmg 0.5	StDmg 1	BPmult	POPx-BPHU
Atascosa	59,053	75,481	87,117	12	74,791
Bexar	2,195,644	2,695,668	3,180,782	3	3,010,225
Caldwell	43,148	64,014	92,471	8	66,573
Calhoun	25,352	32,276	38,881	1	26,114
Comal	112,457	192,808	317,376	2	238,301
DeWitt	22,003	22,216	21,770	7	23,501
Dimmit	14,414	12,825	10,042	0	
Frio	22,136	24,488	26,160	9	24,724
Goliad	6,936	8,345	10,545	0	
Gonzales	27,079	28,330	28,239	16	26,217
Guadalupe	145,771	258,289	424,870	4	279,012
Hays	237,144	474,802	952,790	4	353,058
Karnes	15,735	15,697	16,609	8	18,902
Kendall	33,669	56,429	90,187	3	77,549
La Salle	9,178	9,987	10,835	0	
Medina	52,341	70,896	89,271	19	84,770
Refugio	8,793	8,119	6,888	0	
Uvalde	37,440	36,257	31,631	5	36,684
Victoria	111,013	109,785	101,747	4	116,413
Wilson	43,786	71,683	108,349	31	83,081
Zavala	19,410	17,521	13,540	0	

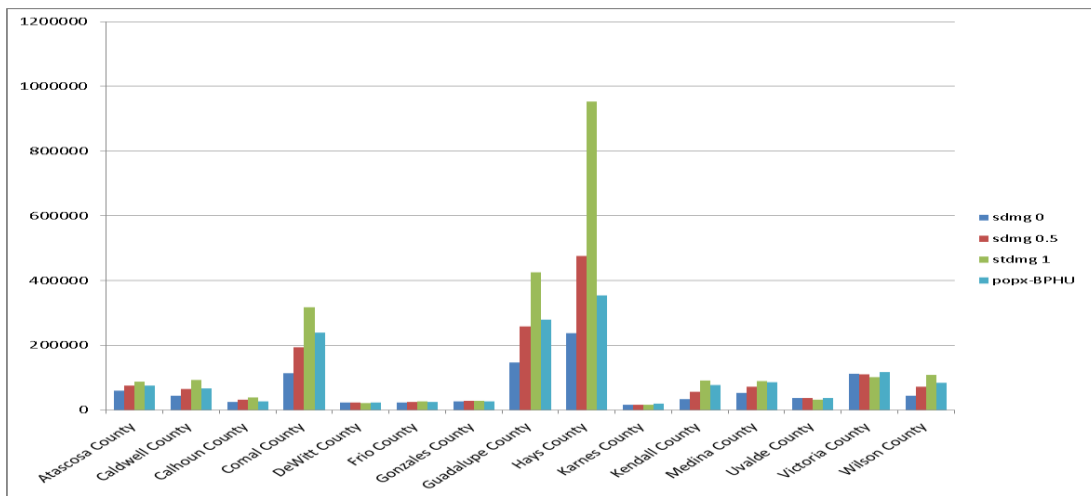
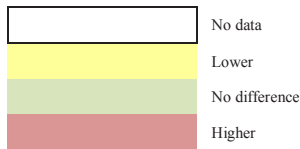
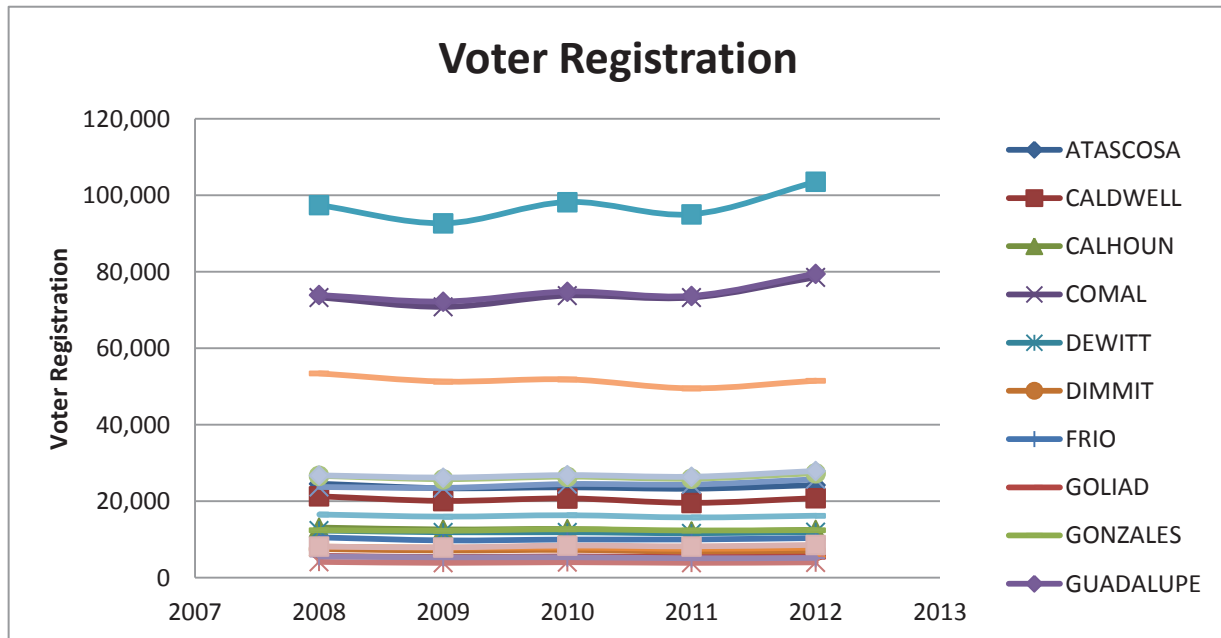


Chart 5: Comparison Chart of State Demographer Scenarios and HU-based population projection values; source: SARA Region L Population Forecast II Housing Units.xls\ hist stdmg BPHU compares

Result 5) There are no forecast graphs due to the use of a single statistical value for HU calculations.

Result 6) There is no comparison table and chart for HU associated with event period-based forecasts of population projection. As the data based on building permits consists of a statistical value, there was not a subset of data from which to calculate an event projection. Instead, voter registration records available for the event period of 2008-2012 (table above) from the Texas Secretary of State was used to graph the voter registration numbers over the event period, for illustration. The general trend is fairly stable, with increases in election years, but with slight overall decline except in historically high growth counties, such as Hays, Guadalupe, and Comal. Bexar, with an average voter registration across the 5 year period of 900,000, is not listed due to the scale of the graph, so that all other county measures can be seen.



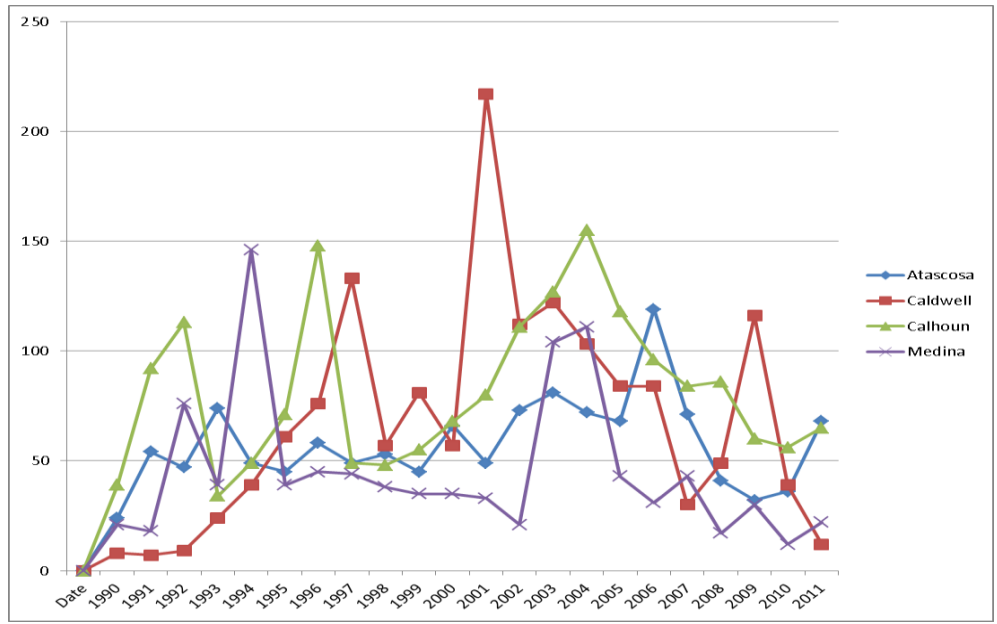
Graph 6: Voter Registration by County 2008-2012; source: SARA Region L Population Forecast II Housing Units.xls\Voter Registration 2008-2012

Result 7) There are no forecast graphs based on the event period.

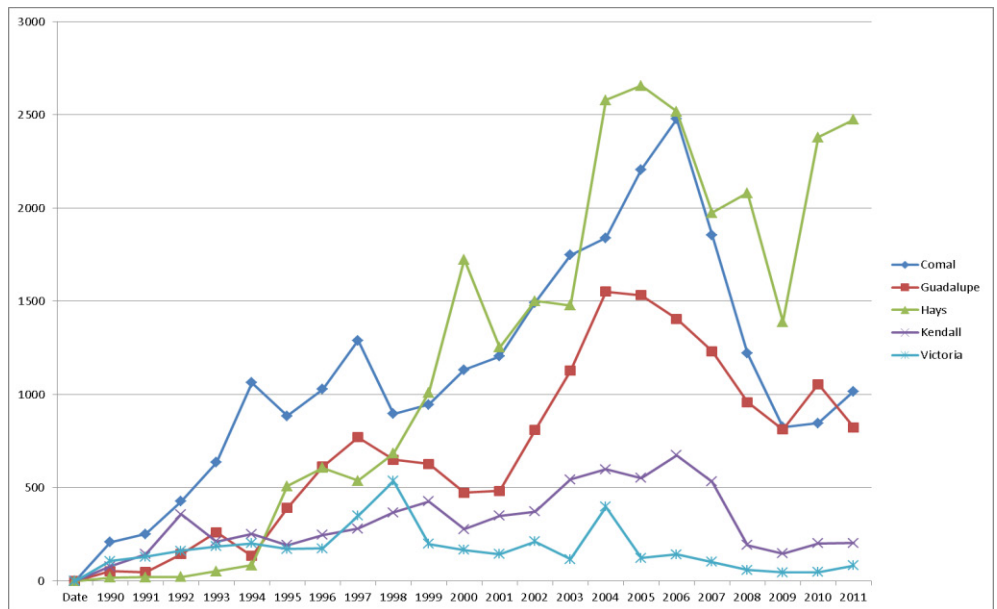
Findings

Generally, the results for HU-related data reflect what was found in terms of the other alternative data for population projections. The statistical target value for 2050 based off of building permits, where that data was available, generally fall within ranges demonstrated across the population projection scenarios, except for DeWitt, Karnes, and Victoria. This may relate to larger proportions of construction in those areas, due to geographic proximity. For example, these three counties are adjacent to each other in the eastern end of the southern part of the EFS corridor.

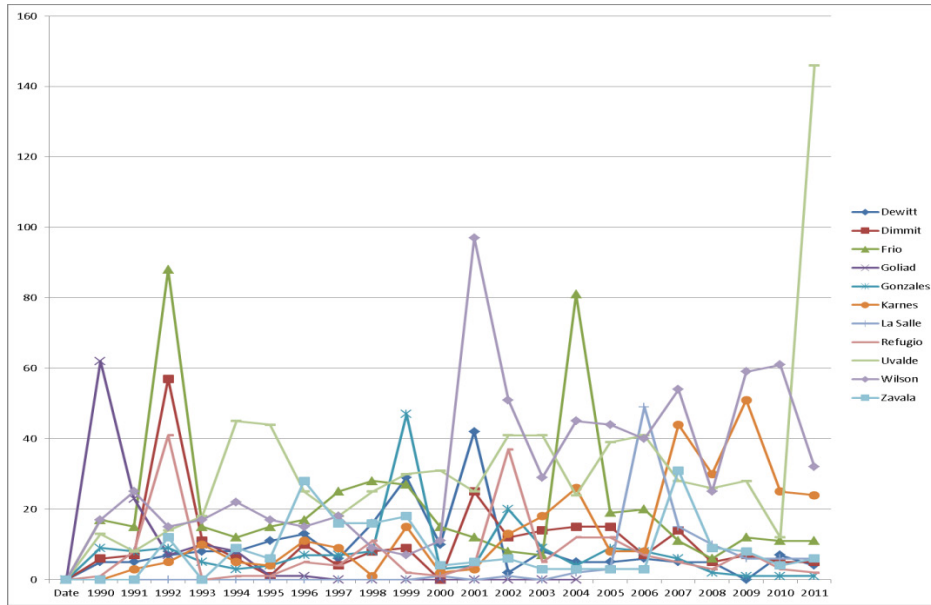
Charts of building permit calculated data used is below; Counties are graphs within similar ranges for easier reading; note that data for some counties, such as Goliad records for 2004, stops early due to data gaps:



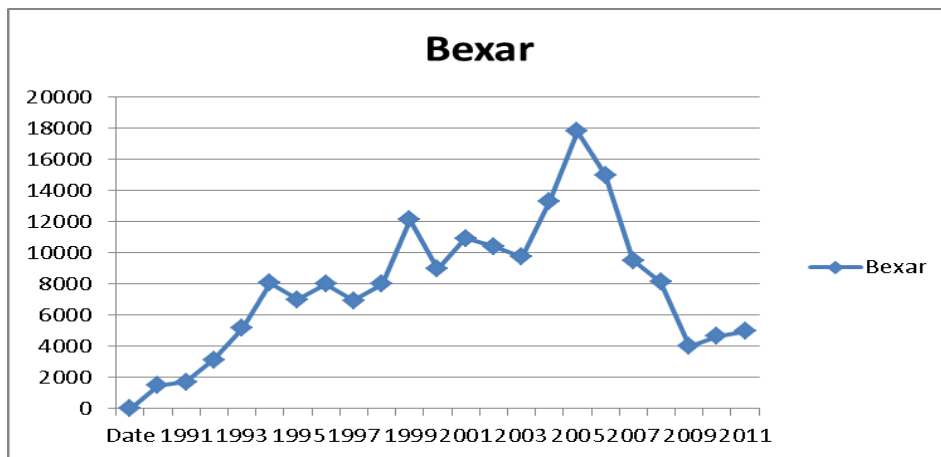
A.



B.



C.



D.

Graph 7: Graphs set of Building Permits by Numerical Range (A., B., C., and D.); source: SARA Region L Population Forecast II Housing Units.xls/charts of bp data

Inferences based on the analysis for this data set are located in the discussion section at the end of this report.

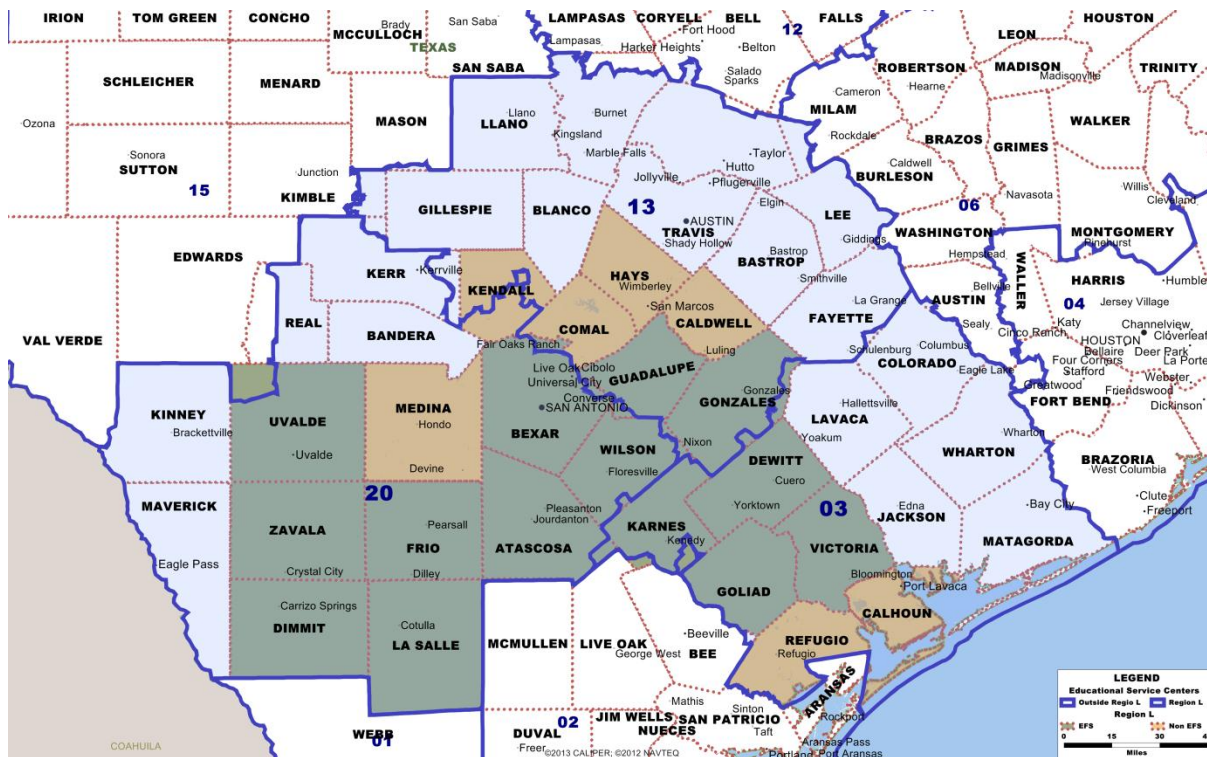
Population Projection III – School Enrollment

For School Enrollment (SE), the Texas Education Agency provided public school enrollment figures, which were based on totals from 2000, and a breakdown by grade from 2009. These figures were used to create projections. Total-based data and grade-based data were analyzed.

As school year data crossed calendar years, the spring semester year was noted for the annual count. For example, the 2008-2009 school year was recognized as 2009 data.

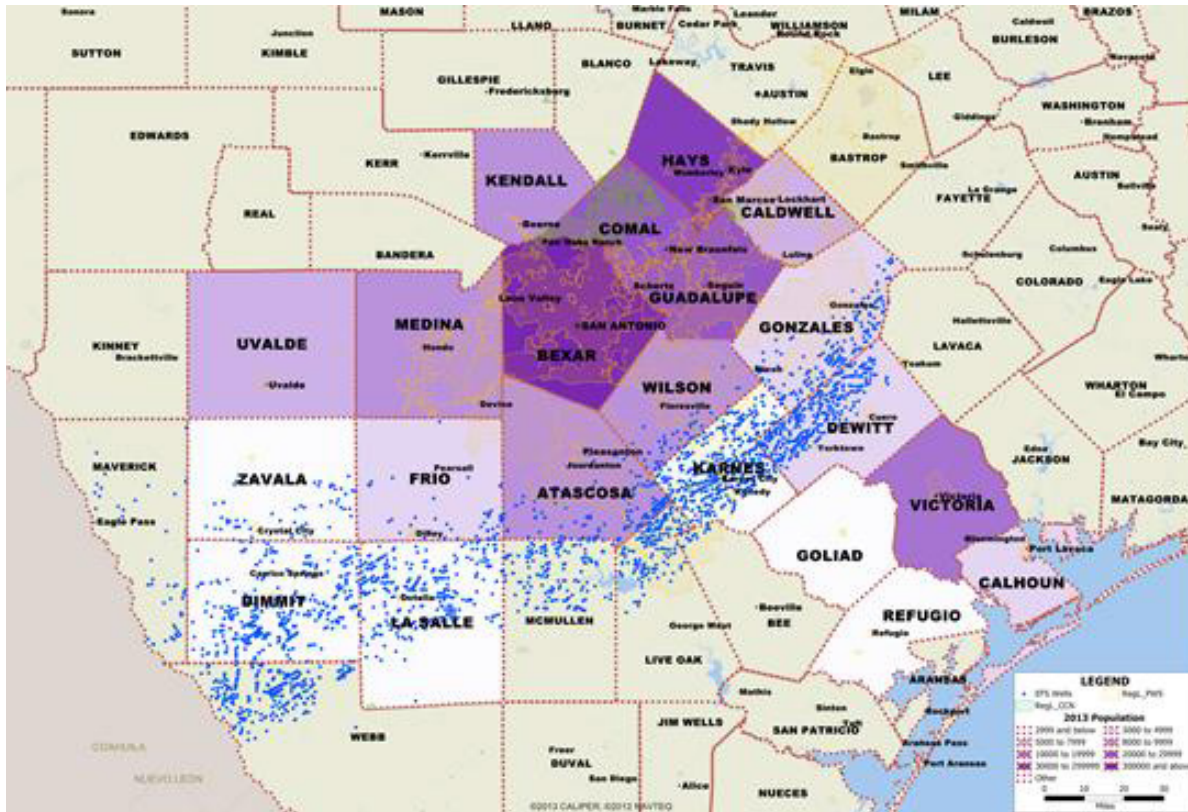
TEA data also included mixed ages, so StDmg data could be compared to each grade, averaged across typical age groups, per grade. For example, for TEA grade 1, StDmg ages 6 and 7 could be averaged and the calculated mean used as a value. TEA data ran from “early education” ages 1-3, pre-kindergarten ages 4-5, kindergarten ages 5-6, first grade ages 6-7, and so forth, until 12th grade ages 17-18. However, a check with this method led to the use of a totals-only method, discussed below.

Of course, because this is public school data, it is not possible to measure children who were homeschooled, homeschooled and participated in an umbrella program with a public school, in private school, those in accelerated high school-to-college programs, those who dropped out, or students who switched between public and nonpublic education systems. Therefore, some difference between StDmg data reflecting all projected children and TEA documented children should exist, but we should see some consistency in patterns across the TEA to StDmg comparisons.



Map 10: TEA Regional Service Center Boundaries; source: CCBR GIS

The third Region L population projection was based on School Enrollment (SE) (Cai, 2007). Persons-per-household multipliers (PHH) were calculated from a ratio of historic SE to population, from 2000-2012, in order to uncover transition patterns. The years 2008 to the present are here referred to as the “event period”, where recent Eagle Ford Shale extraction activities have impacted the Region L area.



Map 11: Total School Enrollment 2013; source: CCBR GIS

For school enrollment data collection, publicly-available data from the Texas Education Agency (TEA) was used. This data is almost entirely available online at the Texas Education Agency’s Public Education Information Management System website, which allows for transparency. More information can be found in the Student Attendance Accounting Handbook from TEA found at: http://www.tea.state.tx.us/index2.aspx?id=7739&menu_id=645&menu_id2=789 and from the search portal: <http://www.tea.state.tx.us/peims/>. As TEA districts and school regions do not track county lines, the TEA records list the students within county boundaries for each county and the district-region number wherein they are registered. Some counties underwent redistricting. Those county totals were listed as “AL”, rather than with a region number. A map of the TEA districts and regions is found at <http://wgisprd.tea.state.tx.us/SDL/>. These figures showed both totals of students per county and breakdowns of students by grade for each county, accessed from the TEA online reports tool found at http://ritter.tea.state.tx.us/adhocrpt/Standard_Reports.html. Totals for students per county from 2000-2007 were accessed through a request to TEA (contact: adhocrpt@tea.state.tx.us). Because school terms comprise more than one calendar year, the spring semester was counted as the annual school enrollment count. Therefore, in counting students, the ending semester year designated the school year for data purposes, for example the 2008-2009 school year is recognized as 2009 data.

Because the TEA data only counts enrollment of publicly-educated children in grades from pre-Kindergarten through grade 12, such data does not measure the number of children who are privately

educated, homeschooled, or participating in other non-traditional educational systems. Accordingly, there was a discrepancy between the numbers used for the population projections from the Texas State Demographer and the TEA's documented numbers of enrolled students, but it was expected that there would still be some consistency in patterns between the two sets of numbers.

The SE data was compared with the figures from the Texas State Demographer's (StDmg) Office data files located at: <http://txsdc.utsa.edu/Data/TPEPP/Projections/Index.aspx>. The StDmg scenarios of 0 (normal migration patterns), .5 (conservative migration patterns), and 1 (aggressive migration patterns) used the same initial numbers from the 2010 U.S. Census count.

TEA data by grade reflected mixed ages. Initially, the study averaged students across typical grade-age totals for each grade from the "single age" population projections for school aged children from the State Demographer's files to arrive at a number of children per grade. TEA data ran from "early education" ages 1-3, pre-kindergarten ages 4-5, kindergarten ages 5-6, first grade ages 6-7, and so forth, up to and including 12th grade ages 17-18. For example, for TEA grade 1, projection file data for ages 6 and 7 were averaged, and the calculated mean used as a value. As some "early education" for some counties had a null value and grades before first grade are not mandated, first through twelfth grades were used. However, the totals by grade were judged to have too much variance, so a second method was used.

The State demographer's projections for ages 6-17 were totaled for each county and compared to the TEA totals per county, which led to figures that were more in alignment. However, it is interesting that TEA counts were generally different from Census based counts that the State Demographer's projections were based from. The numbers for 2010 used for projections were historical counts. This discrepancy may relate to students not counted due to enrollment in private or other types of education, but in rural counties, the difference of students and school aged children (SAC) is sometimes quite large. For example, in the table below, differences of 4263 for TEA and 3021 for Census for De Witt and 6170 for TEA and 5190 for Census for Uvalde can be seen. A difference between TEA and Census of 178 children in La Salle represents 15% of the school aged population. As TEA enumeration is tied to federal funding per child and such documentation follows strict guidelines related to budget considerations, it is likely the TEA numbers represent a more correct tally. It may be possible that students "missing" from the census count are homeless, in "temporary" housing which is not counted, or are from undocumented families, who shy away from federal counting for fear of deportation. These patterns exist across most of the county tallies. It is important to note that these census numbers, from which the State Demographer's projections were calculated, were shown to not reflect actual counts as per TEA data.

Comal County, for example, showed more gradual growth with a sudden jump in SE, and counties in the San Antonio-Austin-Houston transportation/development corridor saw very large increases: Bexar, Comal, Guadalupe, Hays, and Kendall are included within these regions. Although only half of Hays County is in Region L, the county was considered as a whole, due to the inability to break the county data into geographic sections.

In the table below, counties are designated as associated with EFS, and the 2010 data showing a higher number of TEA SE or Census SAC is in bold.

Table 21: Historical School Enrollment and Census counts 2010; source: SARA Region L Population Forecast III School Enrollment.xls

Historical School Enrollment and Census Counts 2010					
Year	TEA /EFS	County Name	County Enrollment	Census SAC	Scenario
2009-2010	20/y	Atascosa	8,761	8,788	0
2009-2010	20/y	Bexar	323,988	309,232	0
2009-2010	13/n	Caldwell	6,351	6,868	0
2009-2010	3/n	Calhoun	4,276	3,863	0
2009-2010	13/n	Comal	24,833	18,131	0
2009-2010	3/y	Dewitt	4,263	3,021	0
2009-2010	20/y	Dimmit	2,395	2,009	0
2009-2010	20/y	Frio	3,192	2,827	0
2009-2010	3/y	Goliad	1,349	1,175	0
2009-2010	13/y	Gonzales	3,856	3,542	0
2009-2010	13/y	Guadalupe	22,198	25,236	0
2009-2010	13/n	Hays	28,652	26,011	0
2009-2010	3/y	Karnes	2,283	1,983	0
2009-2010	13/20/AL/n	Kendall	7,611	5,906	0
2009-2010	20/y	La Salle	1,178	1,000	0
2009-2010	20/n	Medina	8,990	8,288	0
2009-2010	3/n	Refugio	1,462	1,243	0
2009-2010	20/y	Uvalde	6,170	5,190	0
2009-2010	3/n	Victoria	14,918	15,343	0
2009-2010	20/y	Wilson	8,406	8,096	0
2009-2010	20/y	Zavala	2,473	2,379	0

Because historic population data for 2013 is not available, the statistical analysis for School Enrollment and Population does not include 2013. However, 2013 SE data is currently available from the Texas State Education agency; the table below illustrates percent changes the Region L counties are seeing in school enrollment. The change from last year, 2012 is shown, as well as the overall change from 2008 to the present, reflecting the period when extraction industry activities related to Eagle Ford Shale ramped up.

The percent change from last year may not represent the overall positive or negative trend over time, but help illustrate transition rates. Many of these change rates may be judged as substantial, especially when used in conjunction with the population change rate table that may show a disproportionate jump in population compared to SE. For purposes of illustration, very high transition rates over 10% for the event period, and over 4% for one year are in bold. It should be noted that for rural counties which traditionally have much fewer students than urban areas, an increase close to or over 2% for one year may also be judged as a substantial rate of change; especially if that trend continues. Although Calhoun, Refugio, Uvalde and Zavala have seen decreases in percent change over the event period, all counties but Karnes and Uvalde saw increases in SE for 2012-2013.

Table 22: Percent Change of School Enrollment 2012-2013 and 2008-2013; source: SARA Region L Population Forecast III School Enrollment.xls

Percent Change of School Enrollment 2012-2013 and 2008-2013				
County	Mutl Ave 00-12	SE 2013	12-13 %Change	08-13 %Change
Atascosa	5.00	8,984	0.01	0.04
Bexar	5.35	340,030	0.02	0.10
Caldwell	5.76	6,594	0.03	0.06
Calhoun	4.92	4,256	0.00	0.00
Comal	4.63	26,934	0.04	0.19
Dewitt	4.51	4,568	0.02	0.05
Dimmit	4.11	2,444	0.03	0.02
Frio	5.28	3,231	0.01	0.02
Goliad	5.27	1,371	0.01	0.04
Gonzales	5.02	4,127	0.01	0.09
Guadalupe	5.83	24,052	0.02	0.16
Hays	5.51	31,209	0.03	0.17
Karnes	6.27	2,375	0.00	0.04
Kendall	4.18	8,279	0.05	0.11
La Salle	5.22	1,290	0.06	0.06
Medina	4.98	9,308	0.02	0.05
Refugio	5.11	1,398	0.03	-0.03
Uvalde	4.18	5,954	-0.02	-0.03
Victoria	5.60	15,522	0.01	0.05
Wilson	5.00	8,535	0.00	0.05
Zavala	4.60	2,556	0.00	0.00

Results

The findings for population projections based on the data relative to the historic and event periods show variation across counties. Note that for some counties that were losing population going into the projection, an aggressive scenario can show a steeper loss over time of population. Therefore it is important to look at the general shape as well as the final projection numbers to compare characteristic-based projections with census based StDmg projections. County findings are summarized in the discussion section of this study.

Result 1) Historic count data

Result 2) PHH multiplier

Result 3) percent change

Result 4) Historic Comparison of Data-based and StDmg population projections

Result 5) Historic County Forecast charts, see XLS

Result 6) Event Comparison of Data-based and StDmg population projections

Result 7) Event County Forecast charts, see XLS

Data for School Enrollment was analyzed and is illustrated as follows:

Result 1) TABLE 23-24: Historic counts per year per county were graphed to show movement over time. This shows general increases and decreases over the past 13 years in SE and may reflect families moving out of (downward slope) or into (upward slope) a county. Counts of children across grade levels for a county generally held with a range; in other words there was no pattern of sudden changes in birth rates that might translate into differences in the numbers of SAC for a sub-period.

Table 23: TEA SE Totals; source: SARA Region L Population Forecast III School Enrollment.xls

Year	TEA School Enrollment Totals 2000-2013																				
	Atascosa	Bexar	Caldwell	Calhoun	Comal	Dewitt	Dimmit	Frio	Goliad	Gonzales	Guadalupe	Hays	Karnes	Kendall	La Salle	Medina	Refugio	Uvalde	Victoria	Wilson	Zavala
2000	8,241	258,594	6,210	4,249	16,488	4,623	2,535	3,264	1,428	3,875	15,973	18,483	2,622	5,908	1,402	8,296	1,668	6,425	15,848	6,936	2,558
2001	8,343	263,038	6,266	4,127	16,718	4,566	2,467	3,163	1,403	3,913	16,409	19,558	2,561	6,056	1,294	8,404	1,609	6,391	15,574	6,964	2,453
2002	8,359	269,646	6,405	4,252	17,091	4,539	2,487	3,178	1,379	3,909	16,521	20,546	2,546	6,139	1,270	8,542	1,504	6,454	15,530	7,076	2,491
2003	8,507	275,732	6,309	4,216	17,673	4,540	2,487	3,148	1,349	3,899	17,048	21,137	2,471	6,357	1,263	8,568	1,453	6,452	15,707	7,165	2,543
2004	8,507	280,393	6,321	4,298	18,437	4,520	2,485	3,135	1,338	3,879	17,595	21,514	2,439	6,591	1,268	8,672	1,446	6,430	15,661	7,480	2,548
2005	8,569	285,329	6,284	4,260	19,297	4,551	2,416	3,177	1,320	3,830	18,066	22,514	2,381	6,846	1,271	8,593	1,486	6,342	15,370	7,581	2,589
2006	8,564	293,720	6,359	4,326	20,580	4,510	2,446	3,165	1,305	3,766	18,920	23,498	2,390	7,266	1,254	8,644	1,439	6,398	15,258	7,721	2,585
2007	8,550	301,194	6,211	4,338	21,494	4,438	2,467	3,185	1,332	3,782	20,017	25,052	2,350	7,445	1,234	8,654	1,459	6,282	15,008	7,994	2,539
2008	8,616	307,924	6,199	4,267	22,728	4,333	2,388	3,182	1,320	3,798	20,814	26,588	2,289	7,492	1,221	8,829	1,439	6,108	14,803	8,125	2,561
2009	8,661	314,801	6,244	4,394	23,851	4,344	2,382	3,144	1,315	3,808	21,559	27,645	2,269	7,520	1,197	8,925	1,481	6,103	14,951	8,218	2,504
2010	8,761	323,988	6,351	4,276	24,833	4,263	2,395	3,192	1,349	3,856	22,198	28,652	2,283	7,611	1,178	8,990	1,462	6,170	14,918	8,406	2,473
2011	8,802	330,259	6,409	4,227	25,466	4,337	2,400	3,229	1,385	3,936	22,902	29,517	2,286	7,856	1,192	9,111	1,388	6,121	14,943	8,409	2,556
2012	8,882	334,351	6,431	4,238	26,022	4,474	2,444	3,207	1,358	4,084	23,480	26,464	2,380	7,904	1,214	9,133	1,352	6,063	15,388	8,497	2,551
2013	8,984	340,030	6,594	4,256	26,934	4,568	2,377	3,231	1,371	4,127	24,052	31,209	2,385	8,279	1,290	9,308	1,398	5,954	15,522	8,535	2,556

Table 24: Percentage Change of SE-POP 2008-2012, source: SARA Region L Population Forecast III School Enrollment.xls/SE-POP2008-2012%change

Percent Change of School Enrollment and Population 2008-2012						
County	2008 SE	2012 SE	2008 POP	2012 POP	08-12 SE %Change	08-12 POP %Change
Atascosa	8,616	8,882	43,947	46,446	3.09%	5.69%
Bexar	307,924	334,351	1,651,709	1,785,704	8.58%	8.11%
Caldwell	6,199	6,431	37,671	38,734	3.74%	2.82%
Calhoun	4,267	4,238	21,127	21,609	-0.68%	2.28%
Comal	22,728	26,022	103,272	114,384	14.49%	10.76%
Dewitt	4,333	4,474	19,902	20,465	3.25%	2.83%
Dimmit	2,388	2,377	9,833	10,461	-0.46%	6.39%
Frio	3,182	3,207	16,939	17,702	0.79%	4.50%
Goliad	1,320	1,358	7,164	7,351	2.88%	2.61%
Gonzales	3,798	4,084	19,538	20,045	7.53%	2.59%
Guadalupe	20,814	23,480	123,398	139,841	12.81%	13.33%
Hays	26,588	30,343	147,674	168,990	14.12%	14.43%
Karnes	2,289	2,380	14,867	15,233	3.98%	2.46%
Kendall	7,492	7,904	31,754	35,956	5.50%	13.23%
La Salle	1,221	1,214	6,653	7,109	-0.57%	6.85%
Medina	8,829	9,133	45,131	46,765	3.44%	3.62%
Refugio	1,439	1,352	7,430	7,259	-6.05%	-2.30%
Uvalde	6,108	6,063	26,206	26,752	-0.74%	2.08%
Victoria	14,803	15,388	85,762	89,269	3.95%	4.09%
Wilson	8,125	8,497	41,657	44,370	4.58%	6.51%
Zavala	2,561	2,551	11,725	11,961	-0.39%	2.01%

It is interesting that counties with EFS activity show a sudden change to a positive direction around the time of the event period and high extraction industry activity, in conjunction with high market prices for petroleum products.

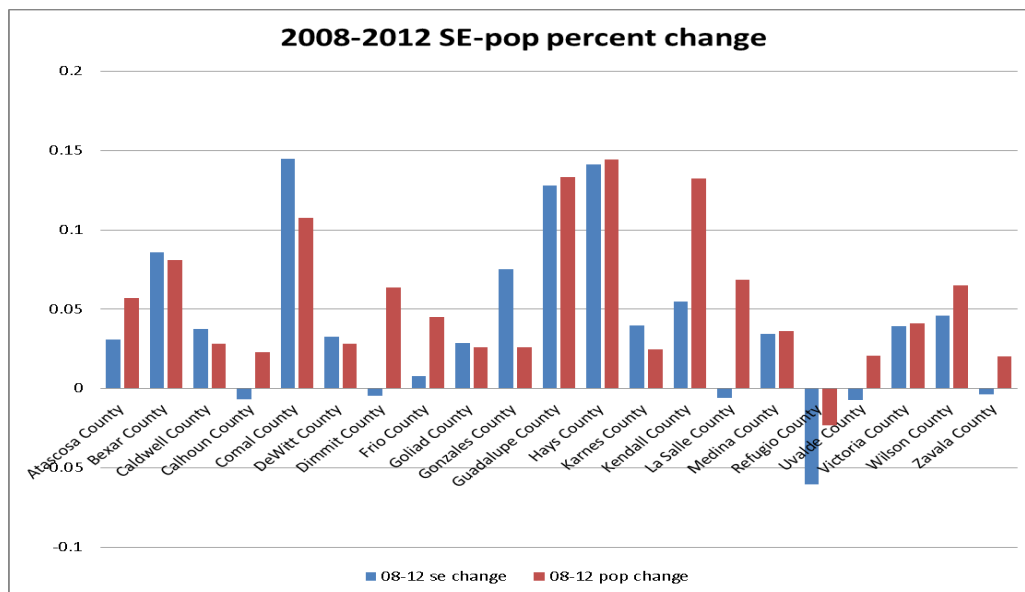


Chart 6: Percentage Change of SE-POP 2008-2012; source: SARA Region L Population Forecast III School Enrollment.xls/SE-POP2008-2012%change

Result 2) TABLE 25; GRAPHS: The actual historical population and SE numbers were used to calculate a persons-per-household (PHH) multiplier (Cai, 2007). These multipliers are much higher, in general, than the standard Texas multiplier of 2.75 (USBC, 2011; Burchell, et al., 2006), but still illustrates the pattern of SE to population. Only De Witt and Gonzales counties show a downward trend in historic PHH from the event period. The multipliers across the historic period were averaged to arrive at an average multiplier from which to project population related to SE (Zhou, 2013).

Result 3) TABLE 26, CHART 7: The percent change chart of the event period is interesting. One would expect SAC and population to track fairly closely, as shown in Guadalupe and Hays counties. However, differences with much lower SE to population change, as seen in La Salle, Uvalde, and Zavala, seem to reflect an influx of population not associated with SAC. This is what we might expect if the population increase was related to a single –person or family–less workforce moving into the region.

Table 25: Historic Multiplier of SE; source: SARA Region L Population Forecast III School Enrollment.xls \SE-StDmg comparison.xls

County	School Enrollment Historic Multiplier														Mud Ave
	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012		
Atascosa	4.68729523	4.77382237	4.87701878	4.85553074	4.94992359	4.95915509	5.02790752	5.10070175	5.10062674	5.15217642	5.1262413	5.17825494	5.22922765	5.0013755487	
Bexar	5.38655576	5.39473384	5.36538647	5.32989642	5.35291181	5.35967252	5.35862386	5.36268983	5.36401515	5.35458274	5.29270529	5.31750232	5.34080652	5.3523140394	
Caldwell	5.184219	5.37089052	5.41998439	5.5999366	5.72694194	5.79057925	5.74508571	5.94203832	6.07694789	6.05845612	5.99370178	5.99812763	6.02301353	5.7638402057	
Calhoun	4.859261	5.03077296	4.83301976	4.88021822	4.81433225	4.86267606	4.8171521	4.81512218	4.95125381	4.86754665	5.00023386	5.07262834	5.09886739	4.9156218904	
Comal	4.7319869	4.82294533	4.84447955	4.80037345	4.77946521	4.71669171	4.64708455	4.63105983	4.5438226	4.45893254	4.36805863	4.39656797	4.395666521	4.6259333443	
Dewitt	4.32900714	4.39465615	4.40956158	4.41277533	4.46371681	4.46978686	4.45853659	4.47756842	4.59312255	4.61510129	4.71428571	4.67027899	4.57420653	4.5063541499	
Dimmit	4.04260355	4.0656668	4.03779654	4.05106554	4.00965795	4.15190397	4.07686018	3.99067694	4.11767169	4.13434089	4.1736952	4.21583333	4.40092554	4.1129767786	
Frio	4.97916667	5.15807777	5.18156073	5.2341169	5.27336523	5.23072081	5.28278041	5.26718995	5.32338152	5.44529262	5.39379699	5.38866522	5.51980044	5.2829165587	
Goliad	4.85154062	5.00356379	5.11312545	5.28910304	5.28475336	5.35606061	5.45670498	5.36186186	5.42727273	5.44258555	5.34469978	5.22960289	5.41310751	5.2749217052	
Gonzales	4.80722581	4.78251981	4.8303914	4.91946653	4.99355504	5.13211488	5.21322358	5.15917504	5.14428647	5.15441176	5.13667012	5.05691057	4.90817826	5.0183176361	
Guadalupe	5.57334252	5.64482906	5.76514739	5.75651103	5.76840011	5.84440385	5.91321353	5.8783534	5.92860575	5.94948745	5.92544373	5.92773557	5.95574957	5.8331709970	
Hays	5.27993291	5.35530218	5.42183393	5.47215783	5.54964209	5.56551479	5.62222317	5.60753632	5.55415977	5.55684572	5.48328214	5.55781414	5.56932406	5.5073514668	
Karnes	5.89092296	5.98984772	5.96150825	6.11857548	6.19475195	6.28601428	6.26987448	6.34042553	6.49497597	6.52490084	6.49321069	6.53805774	6.40042017	6.2694989264	
Kendall	4.01878808	4.03451123	4.06825216	4.0729904	4.0433925	4.06792287	4.00963391	4.07387508	4.23838761	4.34242021	4.38969912	4.4273167	4.54908907	4.1797137666	
La Salle	4.18402282	4.58578053	4.8015748	4.88440222	4.98580442	5.14712825	5.22248804	5.40923825	5.44881245	5.6566416	5.84550085	5.87332215	5.85584843	5.2231203696	
Medina	4.73770492	4.76594479	4.76551159	4.84932306	4.88503229	5.00139649	5.08283202	5.15102843	5.11167743	5.10980392	5.11746385	5.08912304	5.12044235	4.9836372436	
Refugio	4.69304556	4.82597887	5.09640957	5.20509291	5.27662517	5.11507402	5.24530924	5.08156271	5.16330785	5.0033761	5.0499316	5.25288184	5.36908284	5.1059752544	
Uvalde	4.0351751	4.05867626	4.07638674	4.06974582	4.07542768	4.15767897	4.11081588	4.17335244	4.29043877	4.29673931	4.27957861	4.33507597	4.41233713	4.1824175889	
Victoria	5.30590611	5.42513163	5.44578236	5.39084485	5.40948854	5.49466493	5.53991349	5.68103678	5.79355536	5.79459568	5.81800509	5.8585596	5.80120873	5.5968253497	
Wilson	4.67243368	4.79724296	4.84087055	4.94877879	4.9092246	4.97375016	5.05206579	5.04803603	5.12701538	5.13275736	5.10563883	5.20739684	5.221843	5.0028503061	
Zavala	4.53479281	4.72727273	4.66318747	4.52732993	4.51805338	4.46697567	4.50367505	4.59117763	4.57828973	4.61022364	4.72179539	4.635759	4.68874951	4.5974832250	

Table 26: Percent Change SE and POP; source: SARA Blue Region L Population Forecast III School Enrollment.xls

Percent Change of School Enrollment and Population 2008-2012						
County	2008 SE	2012 SE	2008 POP	2012 POP	08-12 SE %Change	08-12 POP %Change
Atascosa	8,616	8,882	43,947	46,446	3.09%	5.69%
Bexar	307,924	334,351	1,651,709	1,785,704	8.58%	8.11%
Caldwell	6,199	6,431	37,671	38,734	3.74%	2.82%
Calhoun	4,267	4,238	21,127	21,609	-0.68%	2.28%
Comal	22,728	26,022	103,272	114,384	14.49%	10.76%
Dewitt	4,333	4,474	19,902	20,465	3.25%	2.83%
Dimmit	2,388	2,377	9,833	10,461	-0.46%	6.39%
Frio	3,182	3,207	16,939	17,702	0.79%	4.50%
Goliad	1,320	1,358	7,164	7,351	2.88%	2.61%
Gonzales	3,798	4,084	19,538	20,045	7.53%	2.59%
Guadalupe	20,814	23,480	123,398	139,841	12.81%	13.33%
Hays	26,588	30,343	147,674	168,990	14.12%	14.43%
Karnes	2,289	2,380	14,867	15,233	3.98%	2.46%
Kendall	7,492	7,904	31,754	35,956	5.50%	13.23%
La Salle	1,221	1,214	6,653	7,109	-0.57%	6.85%
Medina	8,829	9,133	45,131	46,765	3.44%	3.62%
Refugio	1,439	1,352	7,430	7,259	-6.05%	-2.30%
Uvalde	6,108	6,063	26,206	26,752	-0.74%	2.08%
Victoria	14,803	15,388	85,762	89,269	3.95%	4.09%
Wilson	8,125	8,497	41,657	44,370	4.58%	6.51%
Zavala	2,561	2,551	11,725	11,961	-0.39%	2.01%

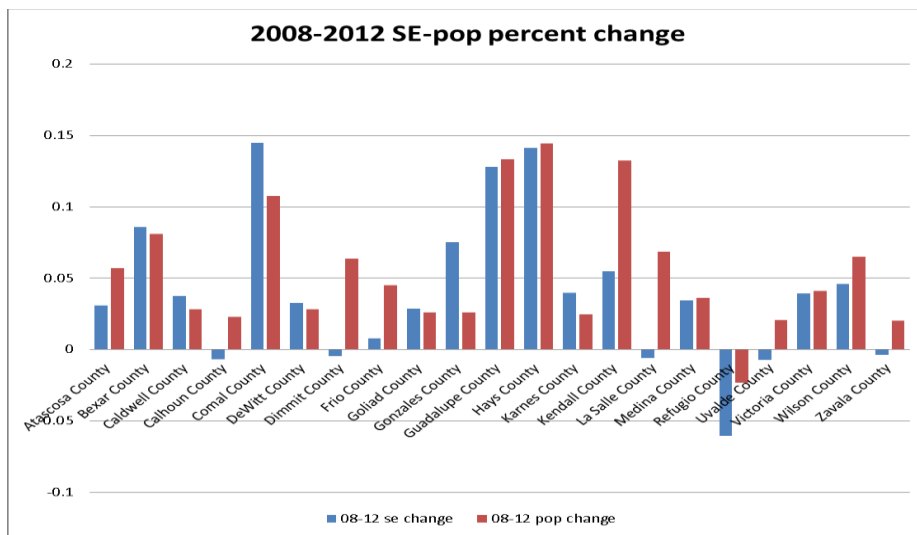


Chart 7: Percentage Change of SE-POP 2008-2012; source: SARA Region L Population Forecast III School Enrollment.xls

Result 4) TABLE 27, CHART 8: The table showing comparison of StDmg migration scenarios is color coded to show projected populations, with population based on SE lower in range in yellow and population in green having no difference in range. The chart of the comparisons illustrates those ranges.

Table 27: Historic SE Comparison with StDmg Scenarios; source: SARA Region L Population Forecast III School Enrollment.xls

Historic School Enrollment Comparison with StDmg Scenarios					
County	StDmg 0	StDmg 0.5	StDmg 1	Ave Mult	POPx-SE
Atascosa	59,053	75,481	87,117	5.2292277	53,631
Bexar	2,195,644	2,695,668	3,180,782	5.3408065	3,119,331
Caldwell	43,148	64,014	92,471	6.0230135	39,973
Calhoun	25,352	32,276	38,881	5.0988674	21,919
Comal	112,457	192,808	317,376	4.3956652	276,088
Dewitt	22,003	22,216	21,770	4.5742065	17,112
Dimmit	14,414	12,825	10,042	4.4009255	8,345
Frio	22,136	24,488	26,160	5.5198004	17,285
Goliad	6,936	8,345	10,545	5.4131075	6,500
Gonzales	27,079	28,330	28,239	4.9081783	21,760
Guadalupe	145,771	258,289	424,870	5.9557496	285,152
Hays	237,144	474,802	952,790	5.5693241	355,394
Karnes	15,735	15,697	16,609	6.4004202	9,140
Kendall	33,669	56,429	90,187	4.5490891	62,451
La Salle	9,178	9,987	10,835	5.8558484	4,470
Medina	52,341	70,896	89,271	5.1204424	58,548
Refugio	8,793	8,119	6,888	5.3690828	3,961
Uvalde	37,440	36,257	31,631	4.4123371	19,338
Victoria	111,013	109,785	101,747	5.8012087	73,656
Wilson	43,786	71,683	108,349	5.221843	69,566
Zavala	19,410	17,521	13,540	4.6887495	12,011

Lower than scenario
 No difference from scenario

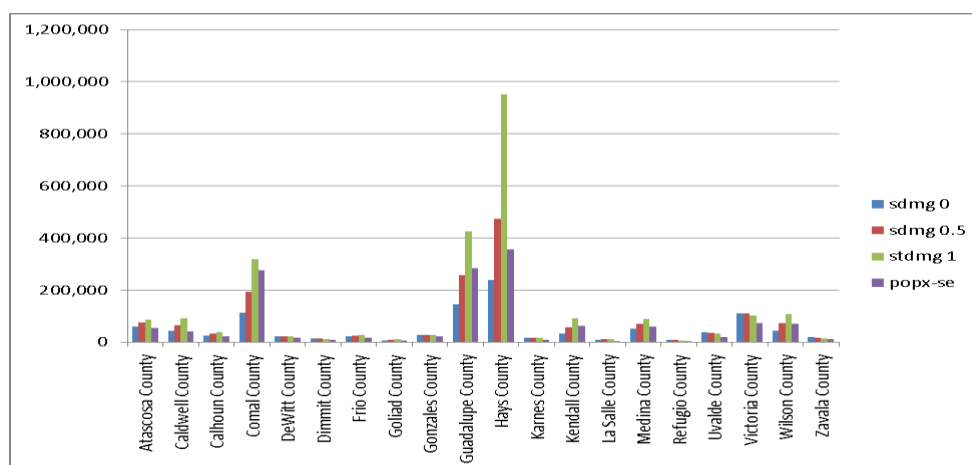


Chart 8: State Demographer Scenarios and School Enrollment graph, based on full historical period; source: SARA Region L Population Forecast III School Enrollment.xls\ SE-StDmg comparison.xls

Result 5) Historic FORECAST GRAPHS: The forecasts graphs of population projection based on SE using the average multiplier for each county are shown in the first series of graphs. The “bubble” of

change is illustrated with an arrow. Some counties, such as De Witt, illustrate a historic bubble of positive upward slope, but the autoregressive method formula sees that as an outlier in relation to the overall historic period and smooths it away into a negative downward slope over time. As this does not reflect the current trends and rate of change, the counties were rerun using the event period plus one prior year for a second set of forecasts for population projection. These are discussed below.

Due to the large amount of county graph and table data, please see Appendix for forecast charts.

Result 6) Event TABLE, CHART: The comparison table and chart associated with the event period-based forecasts of population projection shows a third color code of red, for an SE-based population projection range that is higher than StDMg projections, in addition to the yellow (lower) and green (no difference) color keys.

Table 28: Event SE Comparison with StDMg Scenarios; source: SARA Region L Population Forecast III School Enrollment.xls

Event School Enrollment Comparison with StDMg Scenarios				
County	StDmg 0	StDmg 0.5	StDmg 1	POPx-SE 6yr
Atascosa	59,053	75,481	87,117	58,293
Bexar	2,195,644	2,695,668	3,180,782	3,102,539
Caldwell	43,148	64,014	92,471	53,597
Calhoun	25,352	32,276	38,881	17,848
Comal	112,457	192,808	317,376	262,619
Dewitt	22,003	22,216	21,770	28,103
Dimmit	14,414	12,825	10,042	10,493
Frio	22,136	24,488	26,160	19,700
Goliad	6,936	8,345	10,545	9,620
Gonzales	27,079	28,330	28,239	34,205
Guadalupe	145,771	258,289	424,870	280,406
Hays	237,144	474,802	952,790	283,073
Karnes	15,735	15,697	16,609	20,290
Kendall	33,669	56,429	90,187	57,657
La Salle	9,178	9,987	10,835	8,765
Medina	52,341	70,896	89,271	62,759
Refugio	8,793	8,119	6,888	3,413
Uvalde	37,440	36,257	31,631	21,024
Victoria	111,013	109,785	101,747	115,588
Wilson	43,786	71,683	108,349	58,166
Zavala	19,410	17,521	13,540	12,680

	Lower than scenarios
	No difference from scenarios
	Higher than scenarios

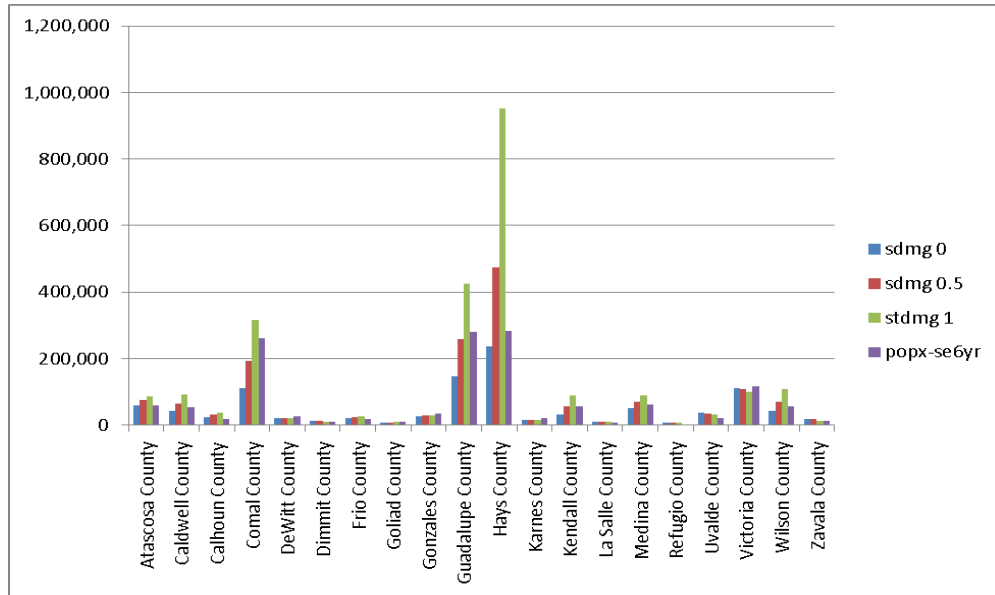


Chart 9: School Enrollment/Employment/Housing Unit chart, based on 6-year Event Period - State Demographer Scenarios; source: Printed SE-StDmg comparison.xls

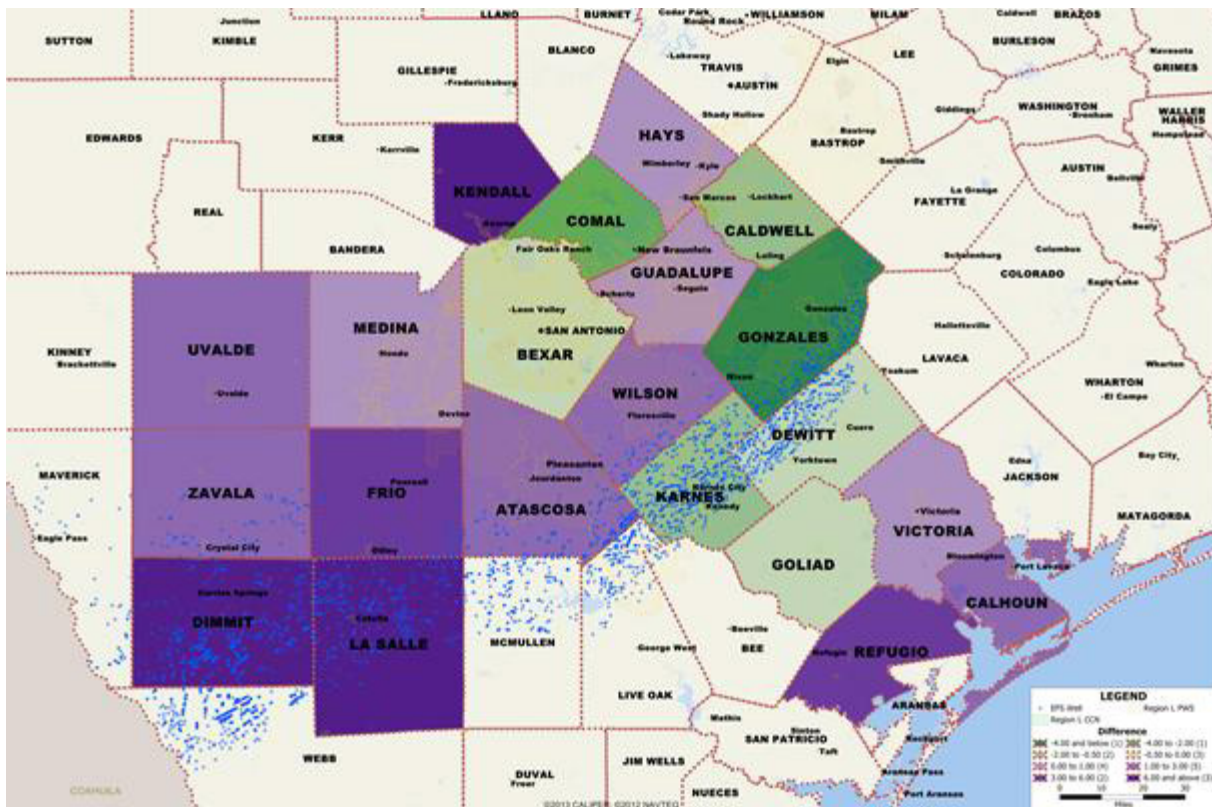
7) event FORECAST GRAPHS: The forecast graphs based on the event period show a series of trend lines where the “bubble” was not smoothed as an outlier, but used in the slope estimations.

Due to the large amount of county graph and table data, please see Appendix for forecast charts.

Findings

The findings for population projections, based on SE relative to the event period, are of substantially higher differences for De Witt, Gonzales and Victoria counties.

Differences are very apparent in the map below, which shows the difference between population increase and school enrollment increase. Purple shows more population officially counted than school enrollment reported and green shows more school enrollment reported than population officially counted. Gonzales, at the darkest green shows a vast difference in the percentage of the number of children reported in public school than of the number of officially counted population. Kendall, on the other hand, shows a vast difference in the percentage of the number of officially counted population than of the number of children reported in public school. Bexar shows reported school enrollment and officially counted population with little percent differences, which would be expected if there was alignment between reported school enrollment and officially counted population. Vivid color change points to the need for recount and a review of population data for that county.

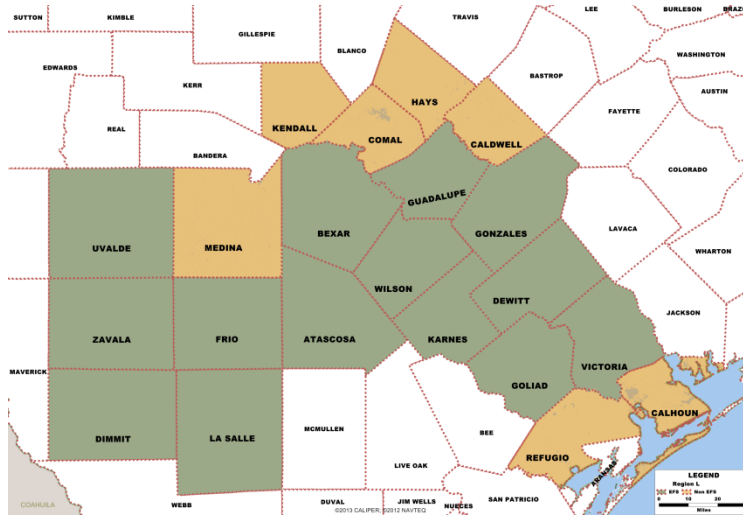


Inferences based on the analysis for this data set are located in the discussion section at the end of this report.

SECTION III

This section breaks down each Region L county individually.

Region L County Map



Map 13: Region L Counties; source: CCBR GIS



Figure 32: Tom Reel; source: San Antonio Express-News, <http://fuelfix.com/blog/2013/04/22/eagle-ford-oil-production-hits-record-high/>

Eagle Ford Shale Counties

Atascosa

Bexar

DeWitt

Dimmit

Frio

Goliad

Gonzales

Guadalupe

Karnes

La Salle

Uvalde

Victoria

Wilson

Zavala

Non-Eagle Ford Shale Counties

Caldwell

Calhoun

Comal

Hays

Kendall

Medina

Refugio

Region L County Breakdown

The counties studied in Region L that are considered to be affected directly by the Eagle Ford Shale play are Atascosa, Bexar, DeWitt, Dimmit, Frio, Gonzales, Guadalupe, Karnes, LaSalle, Uvalde, Victoria, Wilson and Zavala. Counties in the Region L water district that are not in the Eagle Ford Shale area include Caldwell, Calhoun, Comal, Hays, Kendall, Medina and Refugio. In the following section, each county is broken out with a map and descriptive information.

The Eagle Ford Shale Play (EFS) is drastically changing the face of South Texas. The above listed counties that, historically, counted among the poorest in Texas are now undergoing unexpected growth rates, surpassing all estimates. “Oil money” has provided an economic boom to the region. Behind the dollar amounts, communities in transition are facing both opportunities and challenges. “Our small towns are coming to life. Everything is booming.” These statements could be the words of South Texas community leaders observing the transformation happening in their backyards. High paying jobs, boosted demand for local businesses and lease bonuses making landowners millionaires have awakened local economies. The EFS has indeed brought tremendous work opportunities at all education levels. Low-educated inhabitants are particularly benefited, being offered salaries that they could have never have dreamed. In extreme cases, high school graduates are grossing \$8,000 to \$10,000 monthly²³. Such lucrative paychecks would make, in most part of the country, secondary education graduates more than envious.

One downside is pressure on housing and the rise of “trailerhoods”; parks with oilfield workers who temporarily settle in “cramped conditions” . . . separated from family”.²⁴ Workers pair up in small rooms and share common living areas. Although it encourages comradeship, the lack of privacy can, at times, become burdensome. Being an oil worker is rough; away from their family, workers not only need to cope with loneliness, but also to adapt to living conditions that are sometimes far from ideal. However, the growth associated with EFS communities goes well beyond their initial demographic structure. The job market has largely exceeded human resource capacities. As a result, the EFS counties have experienced the massive influx of people coming temporarily to drill, service oil field equipment, or build production plants. For the most part, away from home, the migratory workers’ basic motive is to make big money. They have no real thoughts of settling down; instead taking advantage of the oil boom before going back to live elsewhere. The workers represent a parallel community that has little contact with the locals²⁵.

On the other hand, schools are seeing growth, local businesses in town centers that once seemed like ghost towns are thriving, and talk at government levels is focused on long term plans that include improvements for the future²⁶. The rise of newly rich communities strongly benefit locals who have chosen to serve this growing and wealthy market. Hotel owners have doubled prices while registering unprecedented high occupation rates. Convenience stores that once could count clientele on two hands have had to hire personnel. At night, bars are now full of blue collars searching for entertainment. The growth is exciting to local communities but represents huge challenges for leaders. Roads, traffic, and public safety, all part of infrastructure that has long not needed attention outside of maintenance, now are

23 MySanAntonio.com – MacCormack, J. (February 25, 2013). Karnes County Snapshots: five lives impacted by Eagle Ford. <http://www.mysanantonio.com/eagleford/article/Karnes-County-snapshots-Five-lives-impacted-by-4303394.php>

24 MySanAntonio.com – MacCormack, J. (March 24, 2013). Life is lonely in the Eagle Ford ‘trailerhood’ <http://www.mysanantonio.com/eagleford/article/Life-often-is-lonely-in-the-Eagle-Ford-4379846.php#photo-4364539>

25 MySanAntonio.com- MacCormack, J. (March 24, 2013). Karnes County snapshots: Six lives impacted by Eagle Ford. <http://www.mysanantonio.com/eagleford/article/Karnes-County-snapshots-Six-lives-impacted-by-4379930.php>

26 Amarillo.com -Welch, K. May 19, 2012. Booming business: jobs increase, towns thrive as a result of oil, gas spike. <http://amarillo.com/news/local-news/2012-05-19/booming-business>

at the forefront of policy and planning activities^{27 28}. On the social front, faith-based services and ministries are also seeing an uptick²⁹, as is construction of hotels and other businesses that lay the groundwork for a steady flow of visitors and trade in now bustling South Texas towns³⁰.

While local communities capitalize on the multiple opportunities presented to them by EFS activity, they are also working to examine how their infrastructures can support and control the growth propelled by the EFS activity. Building accommodations, managing water resources, protecting the environment, constructing safe roads, and developing police departments are some of the urgent items on local community planning agendas. On top of that, civic leaders are considering the support of locals who, for whatever reason, are not surfing on the oil wave and, as a result, face tougher living conditions due to drastic increases in the cost of living throughout the region.

In summary, the counties affected by the Eagle Ford Shale are experiencing exceptional economic growth. The ability to harness this growth in a positive manner and ensure that the development of local communities align with it will be decisive on the extent to which oil boom benefits serve the region over the long haul.

27 My SanAntonio.com- MacCormack, J. (March 31, 2013). Plan of action pitched for Eagle Ford growth.

http://www.mysanantonio.com/news/local_news/article/Plan-of-action-pitched-for-Eagle-Ford-growth-4397247.php

28 MySanantonio.com- Hiller, J. March 16, 2013. Eagle Ford fatal crashes up 40%. <http://www.mysanantonio.com/news/energy/article/Eagle-Ford-fatal-crashes-up-40-percent-4359356.php>

29 MySanAntonio.com-Levy, A. March 31, 2013. Faith is helping to fuel daily life in Eagle Ford: Area's church extending their outreach to the workers. <http://www.mysanantonio.com/eagleford/article/Faith-is-helping-to-fuel-daily-life-in-Eagle-Ford-4397662.php#photo-4402759>

30 MySanAntonio.com.Pack, W. May 25, 2012. Hotels booming with oil. <http://www.mysanantonio.com/business/article/Hotels-booming-along-with-oil-3586357.php>

Atascosa County

Atascosa County is immediately south-southwest of Bexar County, and its county seat is Jourdanton. Other towns in the county include Pleasanton, Christine, Charlotte, and Poteet. Poteet features an annual Strawberry Festival that draws over 100,000 visitors from all over the state.³¹

Jourdanton Independent School District has one elementary school, one junior high school, and one high school. Jourdanton Elementary School was named one of Texas's best elementary schools in 2006 according to Texas Monthly magazine.³² Jourdanton Junior High was a TEA "Recognized" campus for the years 2003-2010.³³

The Pleasanton Independent School District is comprised of a primary campus, a junior high, and a high school.³⁴ According to a news article, voters in the school district recently voted to approve a new \$8.9 million bond for improvements in the schools.³⁵ The Pleasanton ISD states that the improvements will be focused on failing infrastructure and planning for projected growth.³⁶

31 Poteet Strawberry Festival Association. (2013). Retrieved April 2, 2013 from: <http://www.strawberryfestival.com/about-us.html>.

32 Jourdanton ISD. (2013). Retrieved April 2, 2013 from: <http://www.jourdantonisd.net/vnews/display.v/SEC/Elementary>.

33 Ibid.

34 Pleasanton Independent School District. 2012-2013. Retrieved April 2, 2013 from: <http://www.pisd.us/?PN=AboutUs>

35 Kokesch, J. (March 13, 2013). "Pleasanton votes for school bond," Kearney Hub. Retrieved April 2, 2013 from:

http://www.kearneyhub.com/news/local/pleasanton-school-bond-passes/article_ce036668-8b86-11e2-a5c8-0019bb2963f4.html.

36 Pleasanton Independent School District. (2013). Retrieved April 2, 2013 from:

<http://www.pisd.us/?DivisionID=13374&ToggleSideNav=DepartmentOnly>.

Bexar County

Bexar County is centrally located in the heart of the Region L water district. Its county seat is San Antonio and this is the largest metropolitan area in the Region L district. There are several outlying cities in Bexar County, including: Alamo Heights, Balcones Heights, Converse, Helotes, Live Oak, Shavano Park, and Universal City. Bexar County is also the home to more than 16 school districts: Alamo Heights ISD, East Central ISD, Edgewood ISD, Ft. Sam Houston ISD, Harlandale ISD, Judson ISD, Lackland ISD, North East ISD, Northside ISD, Randolph Field ISD, San Antonio ISD, Schertz-Cibolo-Universal City ISD, Somerset ISD, Southwest ISD, and Southside ISD (the remaining districts are partially located in Bexar County but majority located in another county).³⁷ The two largest school districts are Northside ISD and North East ISD.³⁸

According to the U.S. Census Bureau, San Antonio had a population of approximately 1,359,758 in 2011.³⁹ San Antonio is a popular tourist destination, drawing more than 26 million visitors each year.⁴⁰ Tourist attractions include: The Alamo, the Riverwalk, the Witte Museum, Six Flags Fiesta Texas, Sea World, and the city's annual ten-day Fiesta event.⁴¹ Major employers in San Antonio are USAA, the United States Department of Defense, Rackspace Hosting, and Valero Energy. San Antonio is known as "Military City, USA," as it is home to more military bases than any other city in the country. It is also known as, "the Alamo City." San Antonio is among the best cities for job seekers and is ranked number nine by Forbes magazine as one of the fastest growing cities in America.⁴²

Northside Independent School District (NISD) serves approximately 205,000 households in the northwest part of San Antonio.⁴³ NISD is San Antonio's largest school district, and the fourth largest school district in Texas, with enrollment growing each year by approximately 2,900 students.⁴⁴ NISD has 112 schools and a student enrollment of approximately 99,372.⁴⁵ "The Northside Independent School District is committed to the belief that children come first. The mission of the district is to encourage each student to strive for personal excellence and to ensure all students learn to function, contribute, and compete as responsible individuals in an ever-changing world."⁴⁶

North East Independent School District (NEISD) intends to, "challenge and encourage each student to achieve and demonstrate academic excellence, technical skills, and responsible citizenship."⁴⁷ The district has over 67,000 students at more than 65 campuses and employees approximately 9,000 people.⁴⁸ In 2008, growth in the northeast part of San Antonio prompted the construction of the city's largest high school, Lady Bird Johnson High School in NEISD.⁴⁹ The district also claims a National Exemplary Community Education Program.⁵⁰

37 Online Directory of Texas. (March 30, 2008). Retrieved April 2, 2013 from: <http://www.bexarcountytexas.us/schooldistrict.htm>.

38 Ibid.

39 State & County QuickFacts. (March 11, 2013). "San Antonio (city), Texas," United States Census Bureau. Retrieved April 15, 2013 from: <http://quickfacts.census.gov/qfd/states/48/4865000.html>.

40 San Antonio Area Tourism Council. (2012). Retrieved April 2, 2013 from: <http://www.sanantoniotourism.com/pages/research.html>.

41 City of San Antonio. (2013). Retrieved April 15, 2013 from: <http://www.visitsanantonio.com/index.aspx>.

42 EconDevoSA. (2013). Retrieved April 15, 2013 from: <http://blog.mysanantonio.com/ecodevosa/>.

43 Northside ISD. (N.D.). "Northside ISD: The destination district," Northside ISD: San Antonio's Premier School District. Retrieved April 15, 2013 from: <http://www.nisd.net/content/northside-isd-destination-district>.

44 Northside ISD. (N.D.). "Enrollment figures," Northside ISD: San Antonio's Premier School District. Retrieved April 15, 2013 from: <http://www.nisd.net/schools/enrollment-figures>.

45 Ibid.

46 46 Northside ISD. (N.D.). "Mission & beliefs," Northside ISD: San Antonio's Premier School District. Retrieved April 15, 2013 from: <http://www.nisd.net/mission-beliefs>.

47 North East Independent School District. (2008). Retrieved April 15, 2013 from: <http://www.neisd.net/webmaster/mission.html>.

48 North East Independent School District. (2008). Retrieved April 15, 2013 from: <http://www.neisd.net/community.html>

49 Ibid.

50 Ibid.

Caldwell County

Caldwell County is one of the counties not affected by the Eagle Ford Shale play. It is located east-northeast of Bexar County and its county seat is Lockhart. Lockhart is known as the “Barbecue Capital of Texas”.⁵¹ People are known to drive out to Lockhart from across the state for its delicious offerings. The Lockhart Independent School District includes four elementary schools, two high schools, a junior high school, Lockhart High School Freshman Campus, Carver Kindergarten School, and Lockhart Discipline Management Center (the district’s alternative school). Lockhart ISD’s mission is to “graduate all of its students as citizens who are educated, productive, and self-fulfilling lifelong learners. The school district’s community, parents, trustees, staff and students will provide a safe, caring, and challenging learning environment in which all students develop to their fullest potential.”⁵²

51 The City of Lockhart. (2005). Retrieved April 2, 2013 from: <http://www.lockhart-tx.org/web98/visitors/bbqcapitaloftexas.asp>

52 Lockhart Independent School District. (N.D.). Retrieved April 2, 2013 from: http://www.lockhartisd.org/apps/pages/index.jsp?uREC_ID=132579&type=d.

Calhoun County

Calhoun County, population 21,000, is located on the Texas Gulf Coast and includes the county seat of Port Lavaca.⁵³ Calhoun County is home to marshes, “coastal prairies,” and several birding sites featuring over 400 species of birds; making it a popular destination on the Texas Birding Trail.⁵⁴ One of the major employers in Caldwell County is Memorial Medical Center. The hospital just announced an expansion to its local clinic.⁵⁵

Calhoun County Independent School District consists of three elementary schools, one middle school, two high schools, and Seadrift School, which serves children from pre-Kindergarten through eighth grade in the Seadrift community. Calhoun County ISD’s stated mission is to reach the highest level of academic achievement, seek community involvement and integrate technology resources.⁵⁶ The school district employs over 500 staff and faculty members.⁵⁷

53 Calhoun County. (2007). Retrieved April 2, 2013 from: <http://www.calhouncotx.org/>.

54 Ibid.

55 Fast Health Corporation. (2013). “Memorial Medical Center news,” Memorial Medical Center. Retrieved April 2, 2013 from: <http://www.mmcporthlavaca.com/getpage.php?name=news&sub=About%20MMC>.

56 Calhoun County ISD. (2011). Retrieved April 2, 2013 from: <http://www.calcoisd.org/index.php/2011-05-04-20-31-55/mission-statement>.

57 Aloe Software Group. (2013). “District demographics,” Calhoun County ISD. Retrieved April 2, 2013 from: <https://onview.peimsdataplus.com/?hash=Zwb8Fdg9M4Sd57f6>.

Comal County

Comal County is just northeast of Bexar County and is not affected by the Eagle Ford Shale play. The Comal County seat is New Braunfels, which was founded by German settlers in 1845.⁵⁸ New Braunfels has an estimated population of 57,740 according to the 2010 U.S. Census.⁵⁹ New Braunfels features two popular tourist attractions: Schlitterbahn Water Park and Wurstfest, a German sausage festival held in November to celebrate the city's German heritage.

The New Braunfels Independent School District (NBISD) has eight elementary schools, two middle schools, a ninth grade center, an alternative school, one high school, and one non-traditional high school called the School of Choice.⁶⁰ During a special meeting on January 31, 2013, the NBISD Board of Trustees approved a land purchase by New Braunfels Utilities (NBU) to allow the utility company to acquire 20 acres of undeveloped land previously belonging to the school district.

This purchase meets long term visions for both entities. NBU has been seeking property where they can establish access to the Trinity Aquifer and develop it as an additional water supply for their customers. With the overlap of the NBISD and NBU service area, this action benefits the community of residents and businesses that both entities serve. It presents a great opportunity for two entities that serve the public to do so in a mutually beneficial manner, which was stated by Paula DiFonzo, CEO of New Braunfels Utilities, of the acquisition.⁶¹ The NBISD Superintendent Randy Moczygamba was also recognized in 2013 by eSchool News as one of its Tech-Savvy Superintendents.⁶²

Comal County was one of the counties our data revealed as experiencing abnormally high growth levels in recent years.

58 The Greater New Braunfels Chamber of Commerce, Inc. (2013). Retrieved April 2, 2013 from: <http://www.nbcham.org/>

59 American Fact Finder. (N.D.). "Community facts: New Braunfels city, Texas," United States Census Bureau. Retrieved April 2, 2013 from: http://factfinder2.census.gov/faces/nav/jsf/pages/community_facts.xhtml.

60 New Braunfels ISD. (N.D.). Retrieved April 2, 2013 from: <http://www.nbisd.org/default.aspx?name=dis.homepage>.

61 Communications. (February 1, 2013). "Agreement reached in NBISD and NBU land purchase," New Braunfels ISD. Retrieved April 2, 2013 from: <http://www.nbisd.org/default.aspx?name=pi.news>.

62 Communications. (February 1, 2013). "eSchool News names Moczygamba Tech-Savvy Superintendent," New Braunfels ISD. Retrieved April 2, 2013 from: <http://www.nbisd.org/default.aspx?name=pi.news>.

DeWitt County

According to the U.S. Census Bureau, DeWitt County is home to approximately 20,465 people.⁶³ The city of Cuero, population 6,841⁶⁴, is the county seat of DeWitt County and is known for its annual Turkeyfest, which originated as advertising for the area's turkey industry.⁶⁵ Turkeyfest features a turkey race between local Cuero turkey "Ruby Begonia" and Worthington, Minnesota turkey "Paycheck" vying for their respective cities' distinction as "Turkey Capitol of the World."⁶⁶ With all this fun occurring, it's easy to understand why Cuero was featured as one of Budget Travel Magazine's "Coolest Small Towns in America" in 2011.⁶⁷ Cuero was also the origination point of the Chisholm Trail.⁶⁸

Cuero is served by the Cuero Independent School District, which has two elementary schools (one for pre-Kindergarteners and one for first, second and third graders), one intermediate school (comprising fourth, fifth, and sixth grades), one junior high school (comprising seventh and eighth grades) and one high school.⁶⁹ Cuero ISD's mission is to "empower all students to reach their potential and become responsible, respectful citizens by teaching an enriched curriculum using all available resources."⁷⁰ The district has approximately 549 high school students, 308 junior high school students, 396 intermediate school students, 418 upper elementary school students and 246 lower elementary school students.⁷¹

63 State & County QuickFacts. (March 11, 2013). "DeWitt County, Texas," United States Census Bureau. Retrieved April 3, 2013 from: <http://quickfacts.census.gov/qfd/states/48/48123.html>.

64 Cuero Retirement Community. (2013). "Demographics," Visit Cuero, Texas. Retrieved April 3, 2013 from: <http://www.cueroliving.org/demographics.php>

65 Cuero Chamber of Commerce. (2012). "Turkey Trot story," Cuero Chamber of Commerce Agriculture & Visitor's Center. Retrieved April 3, 2013 from: <http://www.cuero.org/index.php/typography/history/turkey-trot-story>.

66 The Cuero Turkeyfest Association. (2012). "A brief history on the Turkey Capitol of the World," Turkeyfest. Retrieved April 3, 2013 from: <http://www.turkeyfest.org/about.html>.

67 Intellitrip Media, Inc. (2013). "Photos: Coolest small towns in America," Budget Travel. Retrieved April 3, 2013 from: <http://www.budgettravel.com/slideshow/photos-coolest-small-towns-in-america,7627/#pic=17>.

68 Texas State Historical Association. (N.D.). "DeWitt County," The Handbook of Texas Online. Retrieved April 3, 2013 from: <http://www.tshaonline.org/handbook/online/articles/hcd07>.

69 Cuero Independent School District. (N.D.). "Our schools," Cuero ISD. Retrieved April 3, 2013 from: <http://www.cueroisd.org/SchoolsList.aspx>.

70 Cuero Independent School District. (N.D.). Retrieved April 3, 2013 from: <http://www.cuero.web1.schoolpointe.com/>.

71 Cuero Independent School District. (N.D.). "Cuero ISD General/demographic info," Cuero ISD. Retrieved April 3, 2013 from: http://www.cuero.web1.schoolpointe.com/content_page2.aspx?cid=74.

Dimmit County

Dimmitt County is in southwest Texas, just north of Webb County. Its approximate population in 2012 was 10,641, according to the U.S. Census Bureau.⁷² The county seat is Carrizo Springs, which is named for a type of grass native to the area and also from Artesian well springs nearby.⁷³ Carrizo Springs calls itself the “home of the Dimmit County sunflowers.”⁷⁴ The area has experienced a lot of development recently due to the Eagle Ford Shale play. The City of Carrizo Springs website features a sampling of photos from some of the recent commercial building projects (including hotels, grocery stores, and more) prompted by the late oil and gas industry boom.⁷⁵

The Carrizo Springs Consolidated Independent School District serves all of Dimmit County; including the cities of Asherton and Big Wells. The district includes three elementary schools, an intermediate school, a junior high school and a high school.⁷⁶ School district officials have been trying to encourage attendance at the elementary schools, going so far as to include a rewards program and offering parents tips on how to help children make it to school regularly.⁷⁷

72 State & County QuickFacts. (March 11, 2013). “Dimmit County, Texas,” United States Census Bureau. Retrieved April 3, 2013 from: <http://quickfacts.census.gov/qfd/states/48/48127.html>.

73 The City of Carrizo Springs. (2013). Retrieved April 3, 2013 from: <http://www.cityofcarrizo.org/>.

74 Ibid.

75 Ibid.

76 Carrizo Springs CISD. (N.D.). Retrieved April 3, 2013 from: <http://www.cscisd.net/index.htm>.

77 Carrizo Springs CISD. (N.D.). “Carrizo Springs Elementary,” Carrizo Springs CISD. Retrieved April 3, 2013 from: http://www.cscisd.net/school_CSE/index.htm.

Frio County

Frio County, Texas is situated in the heart of the Eagle Ford Shale oil and gas drilling area. It is west-southwest of Bexar County and its county seat is Pearsall. General Santa Anna of Mexico camped near Pearsall on his way to the battle of the Alamo.⁷⁸ The town was founded when the International-Great Northern Railroad rolled into town and was named after the railroad president, Thomas W. Pearsall.⁷⁹ The city also features a six-foot long peanut sculpture, along with the claim that farms surrounding the city produce 55 million pounds of peanuts every year.⁸⁰

Frio County is served by the Pearsall Independent school district, which has one elementary school, one intermediate school, one junior high school and one high school.⁸¹ Two Pearsall ISD schools (Pearsall Intermediate School and Pearsall Junior High) were rated academically unacceptable by the Texas Education Agency in January 2013.⁸² This means that students attending these schools for the 2013-2014 school year are eligible for transfer to schools in other districts that meet the state's academic standards.⁸³

78 City of Pearsall, Texas. (N.D.). "History of Pearsall," The City of Pearsall. Retrieved April 3, 2013 from: <http://www.cityofpearsall.org/community/history-of-pearsall/>.

79 Ibid.

80 Pohlen, J. (February 1, 2006). "Pearsall: World's Second Largest Peanut," *Oddball Texas: A Guide to Some Really Strange Places*. Chicago Review Press, p. 303.

81 Pearsall Independent School District. (2013). Retrieved April 4, 2013 from: <http://www.pearsallisd.org/>.

82 Pearsall Independent School District. (2013). "Press Release- Public education grant (PEG) letter," Pearsall Independent School District. Retrieved April 3, 2013 from: <http://www.pearsallisd.org/vnews/display.v/ART/511a66db6d4b6>.

83 Ibid.

Goliad County

Goliad County, located near the Texas Gulf Coast, is a part of the Eagle Ford Shale play area. Goliad County is just north of Refugio County, Texas. According to 2012 U.S. Census figures, the population of Goliad County is 7,351.⁸⁴ The area got its name Goliad as an anagram of the name of a priest, Father Hidalgo, who became known as a hero during the Mexican Revolution.⁸⁵ Goliad County is known as the, “birthplace of Texas ranching.”⁸⁶ The city of Goliad, the county seat of Goliad County, is one of the oldest municipalities in Texas.⁸⁷ One of the first major battles of the Texas Revolution occurred at Goliad and the first Declaration of Texas Independence was signed there in 1835.⁸⁸ The city of Goliad holds market days the second Saturday of every month.⁸⁹ Goliad has been experiencing tremendous growth and the city recently voted to approve a program giving an oak tree for residents⁹⁰ building new homes.

Goliad County has one school district- Goliad Independent School District. Home of the Fighting Tigers, Goliad ISD has one elementary school, one intermediate school, one middle school and one high school.⁹¹ Goliad Independent School District has an educational foundation designed to “provide a dynamic program committed to excellence, addressing the needs and interests of all students, yet recognizing their unique qualities and cultures.”⁹² The Goliad ISD Education Foundation recently received a \$10,000 donation from Coletto Creek Power in support of their efforts.⁹³

84 State & County QuickFacts. (March 11, 2013). “Goliad County, Texas,” United States Census Bureau. Retrieved April 4, 2013 from: <http://quickfacts.census.gov/qfd/states/48/48175.html>.

85 Goliad Chamber of Commerce. (2009). “Goliad Texas-History,” Goliad County Chamber of Commerce. Retrieved April 4, 2013 from: <http://www.goliadcc.org/index.php/Goliad-TX-Info/goliad-tx-history.html>.

86 Goliad Chamber of Commerce. 2009. Retrieved April 4, 2013 from: <http://www.goliadcc.org/>.

87 Goliad Chamber of Commerce. (2009). “Goliad Texas-History,” Goliad County Chamber of Commerce. Retrieved April 4, 2013 from: <http://www.goliadcc.org/index.php/Goliad-TX-Info/goliad-tx-history.html>.

88 Ibid.

89 Goliad Chamber of Commerce. (2009). “Goliad Texas-Market days,” Goliad County Chamber of Commerce. Retrieved April 4, 2013 from: <http://www.goliadcc.org/index.php/Goliad-TX-Info/goliad-tx-market-days.html>.

90 Slavik, C. (2013) Goliad city. Retrieved from: http://www.mysoutex.com/view/full_story/21587111/article-Goliad-city-administrator-position-still-vacant

91 Goliad ISD. (August 2012). Retrieved April 4, 2013 from:

http://www.goliadisd.org/index.php?option=com_content&view=article&id=1&Itemid=17

92 Goliad ISD. (February 2008). Retrieved April 4, 2013 from:

http://www.goliadisd.org/index.php?option=com_content&view=article&id=754:gef-mission-a-purpose&catid=123&Itemid=305.

93 Goliad ISD. (August 2010). Retrieved April 4, 2013 from:

http://www.goliadisd.org/index.php?option=com_content&view=article&id=662&Itemid=353.

Gonzales County

Gonzales County is located two counties east of Bexar and is considered within the Eagle Ford Shale region. It includes the cities of Gonzales, Nixon, Pilgrim and Smiley, with Gonzales being the county seat. Gonzales is the home of the first battle of the Texas Revolution and, to this day, its motto is “Come and Take It”. This motto comes from the flag the Texan settlers fashioned in response to Mexican soldiers’ attempting to take back a cannon the Mexican government had provided.⁹⁴ Thirty-two men from Gonzales went on to fight in the Battle of the Alamo. General Travis sent a letter by messenger to Gonzales, from the Alamo, with news of their losses.⁹⁵ Gonzales County has an estimated population of 19,807 and an average household income of \$33,123. The City of Gonzales has an estimated population of 7,237.⁹⁶ Several oil and energy companies have their regional offices in Gonzales including EOG, Marathon Oil, and Lucas Energy.⁹⁷

The Gonzales Independent School District academically serves the Gonzales area. Gonzales ISD has five schools: East Avenue Primary School, Gonzales Elementary School, North Avenue Intermediate School, Gonzales Junior High School, and Gonzales High School.⁹⁸ The school is “committed to a spirit of excellence in caring service and partnerships that equip students for continuous learning supporting resilience in achieving personal aspirations, compassionate and dynamic citizenship in an ever-changing world.”⁹⁹ According to a letter from the school district superintendent, Kimberly A. Strozier, Gonzales ISD is making plans for the construction of new buildings after a demographic study predicted “an increase of approximately 1,100 students across district grade levels by the year 2022.”¹⁰⁰

94 City of Gonzales. (2012). “Our community: History,” City of Gonzales Texas. Retrieved April 4, 2013 from: <http://www.cityofgonzales.org/community.html>.

95 Ibid.

96 Ibid.

97 City of Gonzales. (2012). Retrieved April 4, 2013 from: <http://www.cityofgonzales.org/index.html>.

98 Gonzales ISD. (2013). Retrieved April 4, 2013 from: <http://www.gonzales.txed.net/index.php>.

99 Gonzales ISD. (2013). “Mission,” Gonzales Independent School District. Retrieved April 4, 2013 from: http://www.gonzales.txed.net/index.php?option=com_content&view=article&id=64&Itemid=130.

100 Gonzales ISD. (2013). “Superintendent’s message 4/1/2013,” Gonzales Independent School District. Retrieved April 4, 2013 from: http://www.gonzales.txed.net/index.php?option=com_content&view=article&id=151&Itemid=266.

Guadalupe County

Guadalupe County is located east-northeast of Bexar County. It is within the Eagle Ford Shale play and its county seat is Seguin. Another city of considerable size in Guadalupe County is Schertz, a major producer of pecans; the city holds an annual Pecan festival. It is also home to the world's largest pecan, a concrete sculpture in front of the courthouse.¹⁰¹ The community also supports auto-parts manufacturing, a steel company, and a new Caterpillar engine facility.¹⁰² Seguin was named after Colonel Juan Seguin who fought in the Texas Revolution.¹⁰³ People settled in the area to grow cotton and other crops.¹⁰⁴ Concrete was developed here as a source of building material and it was called "limecrete,"¹⁰⁵ at one time the area had a great concentration of concrete buildings. The city of Schertz, sometimes considered a suburb of San Antonio, is very close to Bexar County. The Schertz family, from the Alsace Lorraine region of France, came to South Texas and ended up purchasing 600 acres of land in Guadalupe County for \$1 per acre.¹⁰⁶ With developments such as a train depot, the town was up and running. Schertz continued to grow and eventually drew the United States military with the creation of Randolph Air Force Base; some of that land was originally owned by Walter J. Schertz of the Schertz family.¹⁰⁷ Schertz is now a thriving community with a population of 31,465¹⁰⁸, having been named by CNN Money as one of the best places to live in the United States.¹⁰⁹

Guadalupe County is the home of Seguin Independent School District as well as Schertz-Cibolo-Universal City Independent School District. Seguin Independent School District has one early childhood center, seven elementary schools, one sixth grade center, two middle schools, one alternative school, one high school, and a non-traditional high school that is more flexible in nature.¹¹⁰ Seguin ISD received a Superior Achievement rating from the Texas School Financial Integrity Rating System of Texas.¹¹¹ Schertz-Cibolo-Universal City Independent School District (SCUC ISD) is headquartered in Schertz and serves several areas cities, as indicated by its name.¹¹² SCUC ISD has seven elementary schools, three intermediate schools, two junior high schools, three high schools (one of which is for at-risk students), and one alternative school.¹¹³ Although the name of the school district includes Universal City, a city located in neighboring Bexar County, "only a small portion of Universal City is situated in the SCUC ISD boundary."¹¹⁴ New property tax rates fund maintenance and operation costs as well as finance facilities.¹¹⁵ The district is over capacity at five of its schools, and within 100 students of capacity levels at eight more schools.¹¹⁶ The district has planned to use a portion of the new funds to build new schools and renovate current schools to accommodate the approximately 600 new students annually.¹¹⁷

101 The City of Seguin. (2011). "Seguin Lives- ICMA Recognition (video)," City of Seguin Texas. Retrieved April 4, 2013 from: <http://www.seguintexas.gov/>.

102 Ibid.

103 Seguin Convention & Visitors Bureau. (2011). "History & legends: A richly layered history and a modern present," Seguin: There's a story here. Retrieved April 4, 2013 from: <http://www.visitseguin.com/about.cfm?p=1&b=2>.

104 Ibid.

105 Ibid.

106 Schertz Chamber of Commerce. (2009). "Historic Schertz: Origins," Schertz Chamber of Commerce: Building a Better Tomorrow. Retrieved April 4, 2013 from: <http://www.schertzchamber.org/history.htm>.

107 Ibid.

108 American Fact Finder. (2010). "Community facts: Schertz city, Texas," United States Census Bureau. Retrieved April 4, 2013 from: http://factfinder2.census.gov/faces/nav/jsf/pages/community_facts.xhtml.

109 Cable News Network. (2013). "Best places to live: Top 100," CNN Money. Retrieved April 4, 2013 from: http://money.cnn.com/galleries/2007/moneymag/0707/gallery.BPTL_top_100.moneymag/40.html.

110 Seguin Independent School District. (2013). Retrieved April 4, 2013 from: <http://www.seguin.k12.tx.us/default.aspx?name=homepage>.

111 Seguin Independent School District. (2013). Retrieved April 4, 2013 from: <http://www.seguin.k12.tx.us/default.aspx?name=homepage>.

112 Schertz-Cibolo Universal City Independent School District. (N.D.). Retrieved April 4, 2013 from: <http://www.scuc.txed.net/index.cfm>.

113 Ibid.

114 Schertz-Cibolo Universal City Independent School District. (N.D.). "Bond 2013," Schertz-Cibolo Universal City. Retrieved April 4, 2013 from: <http://www.scuc.txed.net/faq.cfm>.

115 Ibid.

116 Ibid.

117 Ibid.

Hays County

Hays County is northeast of Bexar County and its county seat is San Marcos. The U.S. Census estimated Hays County's population to be approximately 168,990 in 2012.¹¹⁸ San Marcos is considered to be approximately halfway between San Antonio and Austin. Other cities in Hays County include Buda, Kyle, and Wimberley. San Marcos has a four-year university: Texas State University, which was formerly known as Southwest Texas State and Southwest Texas State Teachers College. Many celebrities are alumni, including President Lyndon B. Johnson, Grammy-winning singer George Strait, Emmy award-winning actor Powers Boothe, writer Tomás Rivera, and columnist and author "Heloise" (Ponce Cruse).¹¹⁹ San Marcos is the home of the San Marcos River, on which the university is set, as well as hike/bike trails and parks.¹²⁰ Its estimated population is 44,894.¹²¹ San Marcos has two outlet malls for shopping luxury brands, the Calaboose African American Museum, Center for Texas Music History, and Commemorative Air Force Exhibit.¹²²

Hays Consolidated Independent School District serves Hays County and has four high schools, a non-traditional high school, an alternative school, five middle schools, and thirteen elementary schools.¹²³ The various schools are located across Kyle, Buda, Niederwald and San Marcos. The central office is located in Kyle.¹²⁴ The district covers more than 221 square miles and serves approximately 16,000 students.¹²⁵ Hays CISD have award-winning theater arts, athletic, and music programs at Lehman high schools, as well as a culinary and Nay JROTC program at Lehman High School.¹²⁶ Hays High School has a Marine JROTC program and celebrated its 40th anniversary in 2007.¹²⁷ The district opened two new elementary schools in 2010 to keep up with rapid growth. They expect to continue seeing significant increases in student enrollment.¹²⁸ San Marcos Consolidated Independent School District (SMCISD) also serves students in Hays County, mostly in the city of San Marcos. The district has six elementary schools, two middle schools, one high school, and one non-traditional high school.¹²⁹ San Marcos High School (SMHS) was one of the top Texas high schools to be recognized by the Texas ACT Readiness Council for the growing number of SMHS students taking the SCT exam in preparation for college.¹³⁰ SMCISD's Travis Elementary School won a National Green Ribbon School award for the second time in 2012.¹³¹ The district has approximately 7,546 students enrolled and an operating budget of approximately \$56,489,775.¹³²

118 State & County QuickFacts. (March 11, 2013). "Hays County, Texas," United States Census Bureau. Retrieved April 5, 2013 from: <http://quickfacts.census.gov/qfd/states/48/48209.html>.

119 Texas State University-San Marcos. (N.D.). "Points of pride," Texas State University-San Marcos. Retrieved April 5, 2013 from: http://www.txstate.edu/about/25points.html#distinguished_alumni.

120 San Marcos Convention and Visitor Bureau. (N.D.). Retrieved April 5, 2013 from: <http://www.toursanmarcos.com/visitor-information/index.html>.

121 Ibid.

122 San Marcos Convention and Visitor Bureau. (N.D.). Retrieved April 5, 2013 from: <http://www.toursanmarcos.com/attractions/index.html>.

123 Hays Consolidated I.S.D. (N.D.). "District overview," Hays CISD. Retrieved April 5, 2013 from: <http://www.hayscisid.net/district.cfm?subpage=3968>.

124 Hays Consolidated I.S.D. (N.D.). "District map," Hays CISD. Retrieved April 5, 2013 from: <http://www.hayscisid.net/schools.cfm?subpage=1442>.

125 Hays Consolidated I.S.D. (N.D.). "District overview," Hays CISD. Retrieved April 5, 2013 from: <http://www.hayscisid.net/district.cfm?subpage=3968>.

126 Ibid.

127 Ibid.

128 Ibid.

129 San Marcos Consolidated Independent School District. (2012). "2012 Fact sheet," Retrieved April 5, 2013 from: <http://www.smcisd.net/files/filesystem/2012%20Fact%20Sheet.pdf>.

130 Ibid.

131 Ibid.

132 Ibid.

Karnes County

Karnes County is southeast of Bexar County and is in the Eagle Ford Shale play area. Karnes County has a population of 15,233 according to the U.S. Census.¹³³ The county seat, Karnes City, is 52 miles southeast of San Antonio.¹³⁴ Other areas include Kenedy, Falls City, and Gillett. Major industries in the area include agriculture, oil and gas, ranching and fiberglass production.¹³⁵ Karnes County is served by Karnes City Independent School District, Falls City Independent School District, and Kenedy Independent School District.

Karnes City Independent School District has three schools, an elementary, middle and high school.¹³⁶ According to the district's website, "Karnes City ISD provides: A strong preparation in mathematics, language arts, social studies, science and foreign language, an outstanding band program that begins in the sixth grade, and comprehensive programs for children with disabilities beginning as early as age 3. Counseling services are provided at each school."¹³⁷

Kenedy Independent School District has a mission to, "inspire, prepare and educate students by personalizing the learning experience in order to achieve each student's vision for the future. Together as a team of students, parents, staff and community this mission is accomplished."¹³⁸ The district has one elementary school, one middle school, and one high school.¹³⁹ Kenedy ISD received an Accredited-Warned status from the Texas Financial Accountability Rating System.¹⁴⁰ This means the state disapproves of the district's financial accountability measures for the school years 2008-2009 and 2009-2010.¹⁴¹ If Kenedy ISD fails to improve its rating, the State of Texas could revoke its accreditation as a Texas public school, but the school district is making efforts to amend the situation.¹⁴²

Falls City Independent School District has approximately 331 students at one location serving students from Kindergarten through 12th grade.¹⁴³ Falls City ISD's mission is "to provide our students with a high quality education so that they may become productive citizens through cooperative efforts between the school district, community, parents, and students."¹⁴⁴

133 State & County QuickFacts. (March 11, 2013). "Karnes County, Texas," United States Census Bureau. Retrieved April 5, 2013 from: <http://quickfacts.census.gov/qfd/states/48/48255.html>.

134 Texas State Historical Association. (N.D.). "Karnes County," Handbook of Texas Online. Retrieved April 5, 2013 from: <http://www.tshaonline.org/handbook/online/articles/hck01>.

135 Ibid.

136 Karnes City ISD. (2013). Retrieved April 5, 2013 from:

<http://www.kcisd.net/education/components/scrapbook/default.php?sectiondetailid=217&>

137 Karnes City ISD. (2013). "Curriculum," Karnes City Independent School District. Retrieved April 5, 2013 from:

<http://www.kcisd.net/education/components/whatsnew/default.php?sectiondetailid=2521&linkid=nav-menu-container-1-8923>.

138 Kenedy ISD. (N.D.). Retrieved April 5, 2013 from: <http://www.kenedy.isd.tenet.edu/>.

139 Ibid.

140 Kenedy ISD. (N.D.). "Kenedy ISD Accreditation Status," Kenedy ISD. Retrieved April 5, 2013 from:

<http://www.kenedy.isd.tenet.edu/sites/default/files/Required/Accreditation%20Status%20Letter.pdf>

141 Ibid.

142 Ibid.

143 Falls City Independent School District. (N.D.). "About us," Falls City Independent School District. Retrieved April 5, 2013 from:

http://www.fcisd.net/apps/pages/index.jsp?uREC_ID=200650&type=d&pREC_ID=434901.

144 Ibid.

Kendall County

Kendall County is located northwest of Bexar County and is not considered a county affected by the Eagle Ford Shale play. Kendall County has undergone tremendous population growth since 2000 and in 2011 had a population of approximately 34,781.¹⁴⁵ From 1990 to 2010, Kendall County had the eighth highest percentage population growth in Texas.¹⁴⁶ Area homebuilders are rapidly building new units to meet the housing demands of the new populace, and according to the Kendall County Economic Development Corporation, the average home price in 2006 was \$212,000.¹⁴⁷ Kendall County has the fourth highest per capita income in all of Texas.¹⁴⁸

The main city in Kendall County is Boerne and major employers in the area include Boerne Independent School District, H.E.B. Grocery Store, and Mission Pharmacal.¹⁴⁹ Boerne was incorporated in 1909 and now has a mayor and city council form of government.¹⁵⁰

Boerne Independent School District has approximately 7,100 students enrolled at its five elementary schools, two middle schools, two high schools, and two alternative schools.¹⁵¹ Boerne ISD's vision is "our community will engage students and adults in a challenging educational environment that inspires creativity and enriches lives for today's realities and tomorrow's possibilities."¹⁵² In January 2013, the Boerne ISD school board unanimously voted to place a \$99 million bond election on the May 2013 ballot. If approved, the bond would go toward technology upgrades, facility upgrades, expansions (including a new elementary school building) and additional safety measures.¹⁵³

145 Kendall County EDC. (2008). "Population," Kendall County Economic Development Corporation. Retrieved March 12, 2013 from: <http://www.kendallcountyedc.com/demographics/population>.

146 Ibid.

147 Ibid.

148 Kendall County EDC. (2008). "Demographics," Kendall County Economic Development Corporation. Retrieved March 12, 2013 from: <http://www.kendallcountyedc.com/demographics>.

149 Kendall County EDC. (2008). "Top employers," Kendall County Economic Development Corporation. Retrieved March 12, 2013 from: <http://www.kendallcountyedc.com/demographics/top-employers>.

150 Kendall County EDC. (2008). "Boerne facts," Kendall County Economic Development Corporation. Retrieved March 12, 2013 from: <http://www.kendallcountyedc.com/community-profile/boerne-facts>.

151 Boerne Independent School District. (N.D.). "About us," Boerne Independent School District: Committed to Excellence. Retrieved April 5, 2013 from: <http://www.boerne-isd.net/page.cfm?p=10038>.

152 Ibid.

153 Boerne Independent School District. (N.D.). "Board of trustees calls for \$99 million bond election," Boerne Independent School District: Committed to Excellence. Retrieved April 5, 2013 from: <http://www.boerne-isd.net/page.cfm?p=11521&newsid=228>.

La Salle County

La Salle County is located just north of Webb County and is a part of the Eagle Ford Shale play. The La Salle County seat is Cotulla, which is located 87 miles southwest of San Antonio. Cotulla was established by a Polish immigrant in 1881 as a stop for the International-Great Northern Railroad and a depot was built the following year.¹⁵⁴ Cotulla's estimated population is approximately 3,614 according to the Cotulla La Salle Chamber of Commerce.¹⁵⁵ The Cotulla area is economically disadvantaged, with approximately 25% of the population living on a total annual household income of less than \$10,000 and with approximately 49% of the population having not graduated high school.¹⁵⁶

Cotulla is known for being the small town where President Lyndon B. Johnson once taught elementary school in order to afford his studies at Texas State University (known at the time as Southwest Texas Teacher's College).¹⁵⁷

As one of the major players experiencing growth due to the Eagle Ford Shale play, La Salle County has had to find ways to accommodate new residents. A San Antonio developer has begun meeting booming housing demands in La Salle County with apartments made from shipping containers.¹⁵⁸ The area has also experienced problems with cell phone reception due to cell phone towers being crowded with too many users.¹⁵⁹

Cotulla Independent School district includes the following campuses: Encinal Elementary School and Ramirez Burks Elementary School, Frank Newman Middle School and Cotulla High School.¹⁶⁰ The mission of Ramirez Burks Elementary School is to be "a place where dedicated personnel encourage high expectations for all students in a supportive, nurturing environment; where individual student potential is maximized through challenging curriculum and where both parental and community involvement are encouraged to enhance our many successes."¹⁶¹

154 Peterson, B. (March 1, 2009). "Cotulla exhibit to open this week at LBJ Museum," San Marcos Mercury. Retrieved April 12, 2013 from: <http://smmercury.com/2009/03/01/cotulla-exhibit-to-open-this-week-at-lbj-museum/>.

155 Cotulla La Salle Chamber of Commerce. (June 14, 2011). "Cotulla at a glance," Cotulla La Salle Chamber of Commerce. Retrieved April 12, 2013 from: <http://www.cotulla-chamber.org/index.php/growth/cotulla-at-a-glance>.

156 Ibid.

157 Peterson, B. (March 1, 2009). "Cotulla exhibit to open this week at LBJ Museum," San Marcos Mercury. Retrieved April 12, 2013 from: <http://smmercury.com/2009/03/01/cotulla-exhibit-to-open-this-week-at-lbj-museum/>.

158 Gonzales, E. (March 28, 2013). "Shipping containers to house Eagle Ford workers," *KENS 5 San Antonio*. KENS 5-TV, Inc. Retrieved April 12, 2013 from: <http://www.kens5.com/news/Shipping-containers-to-house-Eagle-Ford-Shale-workers-200437751.html>.

159 Mylar, B. (September 13, 2011). "Oil boom causing cell phone problems?" KSAT.com. Retrieved April 12, 2013 from: <http://www.ksat.com/news/Oil-Boom-Causing-Cell-Phone-Problems/-/478452/3855442/-/513jq7z/-/index.html>.

160 Cotulla Independent School District. (2013). "Schools," Cotulla Independent School District. Retrieved April 12, 2013 from: <http://www.cotullaisd.org/education/components/sectionlist/default.php?sectiondetailid=6>.

161 Cotulla Independent School District. (2013). "Mission statement," *Ramirez Burks Elementary School*. Cotulla Independent School District. Retrieved April 12, 2013 from: <http://www.cotullaisd.org/education/components/docmgr/default.php?sectiondetailid=11238&>.

Medina County

Medina County is located just west of Bexar County and its county seat, centrally located, is Hondo. According to the U.S. Census, Medina County had approximately 46,765 people in 2012.¹⁶² In 2010, Hondo had a population of approximately 8,803 according to the U.S. Census Bureau.¹⁶³ Other towns in Medina County include Devine, Natalia, and Castroville.

The Medina River flows through the northeastern part of the county and provides water for agricultural land through Medina Lake Reservoir, which was completed in 1913.¹⁶⁴ Recent droughts have drained the reservoir, worrying residents and business proprietors in the area.¹⁶⁵ According to Bobby Harris, who closed his restaurant in the area in 2012, the area near the lake that once had a population of approximately 5,839 is now “a ghost town” due to the drying up of the lake’s waters.¹⁶⁶

Hondo is home to a popular and somewhat famous road sign stating, “This is God’s Country, Please Don’t Drive Through it Like Hell.”¹⁶⁷ Hondo has several annual festivals and events, including the Cowboy Country Roundup, County Fair, Wild Game Festival, Night Parade and Hondo’s Army Air Field Fly-In.¹⁶⁸ The Fly-In celebrates the South Texas Regional Airport, which was once the world’s largest flight navigation school during the Second World War, known then as the Hondo Air Field.¹⁶⁹

The Hondo Independent School District has one elementary school, one intermediate school, one middle school, one high school and one alternative school.¹⁷⁰ The mission of the Hondo ISD is to, “make learning the priority of all and serve the educational needs of every student, in every classroom, every day.”¹⁷¹ With the exception of McDowell Middle School and Woolls Intermediate School, who received “Academically Unacceptable” ratings, the schools at Hondo Independent School District were deemed “Academically Acceptable” according to 2011 state accountability ratings.¹⁷²

162 State & County QuickFacts. (March 11, 2013). “Medina County, Texas,” United States Census Bureau. Retrieved April 12, 2013 from: <http://quickfacts.census.gov/qfd/states/48/48325.html>.

163 American Fact Finder. (2010). “Community facts: Hondo city, Texas,” United States Census Bureau. Retrieved April 12, 2013 from: http://factfinder2.census.gov/faces/nav/jsf/pages/community_facts.xhtml

164 Ochoa, R. (N.D.). “Medina County,” *Handbook of Texas Online*. Texas Historical Association. Retrieved April 12, 2013 from: <http://www.tshaonline.org/handbook/online/articles/hcm10>.

165 MacCormack, Z. (January 6, 2013). “Residents on edge as Medina Lake evaporates,” *San Antonio Express News*. Hearst Communications. Retrieved April 12, 2013 from: http://www.mysanantonio.com/news/local_news/article/Residents-on-edge-as-Medina-Lake-evaporates-4170463.php#photo-3816114.

166 Ibid.

167 Office of the Governor, Economic Development and Tourism. (2013). “Hondo,” Texas: It’s Like a Whole Other Country. Retrieved April 12, 2013 from: <http://www.traveltexas.com/cities/hondo.aspx>.

168 Ibid.

169 Ibid.

170 Hondo Independent School District. (2013). “Hondo ISD,” Hondo ISD. Retrieved April 4, 2013 from: <http://www.hondo.k12.tx.us/?PN=AboutUs>.

171 Ibid.

172 Ibid.

Refugio County

Refugio County lies along the Texas Gulf Coast and is not considered a county affected by the Eagle Ford Shale play. Refugio County was established by the Spanish in 1795 as a mission for the native Karankawa peoples.¹⁷³ In the late 1820s, Irish settlers began to colonize the area and many Texans of Irish descent still live in Refugio today.¹⁷⁴ Approximately one-hundred years later oil exploration began in the area, which prompted the development of the oil and gas industry as a major source of employment and economic development.¹⁷⁵ This industry remains one of the area's significant industries, along with agriculture.¹⁷⁶

Refugio Independent School District is one of three area districts serving Refugio County. Woodsboro Independent School District and Austwell-Tivoli Independent School District also serve children in Refugio County.¹⁷⁷ Refugio ISD has an elementary school, which serves students from pre-Kindergarten through sixth grade, and a high school serving students from seventh through twelfth grades.¹⁷⁸ Refugio ISD recently completed a new building on the high school campus to serve seventh and eighth grade students.¹⁷⁹

173 Refugio County Texas. (N.D.). Refugio County Texas: Home History Heritage. Retrieved April 4, 2013 from: <http://www.refugiocountytx.org/index.htm>.

174 Ibid.

175 Ibid.

176 Ibid.

177 Ibid.

178 Refugio ISD. (2007). Refugio High School. Retrieved April 12, 2013 from: <http://classroom.refugioisd.net/webs/rhs/home.htm>.

179 Refugio County Texas. (N.D.). Refugio County Texas: Home History Heritage. Retrieved April 4, 2013 from: <http://www.refugiocountytx.org/index.htm>.

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173 Refugio County Texas. (N.D.). Refugio County Texas: Home History Heritage. Retrieved April 4, 2013 from: <http://www.refugiocountytx.org/index.htm>.

174 Ibid.

175 Ibid.

176 Ibid.

177 Ibid.

178 Refugio ISD. (2007). Refugio High School. Retrieved April 12, 2013 from: <http://classroom.refugioisd.net/webs/rhs/home.htm>.

179 Refugio County Texas. (N.D.). Refugio County Texas: Home History Heritage. Retrieved April 4, 2013 from: <http://www.refugiocountytx.org/index.htm>.

Uvalde County

Uvalde County is one county west of Bexar County, and is affected by the Eagle Ford Shale play. The U.S. census Bureau estimated Uvalde County's 2012 population to be 26,752.¹⁸⁰ Uvalde County was originally formed from part of Bexar County in 1850, but didn't officially acquire enough settlers until 1852.¹⁸¹ It was founded by Reading Black, who also founded the city of Uvalde after the Civil War.¹⁸² During the early Twentieth Century, approximately 25% of all mohair produced in the U.S. came from Uvalde County.¹⁸³ Agriculture in the area also included crops such as peaches, beans, pecans, cattle and tomatoes.¹⁸⁴ Garner State Park in Uvalde County was built in the 1930s by the Civilian Conservation Corps and Garner Army Air Field opened in 1941.¹⁸⁵ The National Fish Hatchery was built in the area to harvest catfish and largemouth bass.¹⁸⁶ Uvalde County is also home to many crystal clear creeks and springs, giving it the nickname "County of 1,000 Springs."¹⁸⁷

Uvalde Consolidated Independent School District (Uvalde CISD) serves the children in Uvalde County. The district has nine campuses including: Anton Elementary, Batesville School, Benson Elementary, Dalton Early Childhood Center, Excel Academy, Flores Elementary, Robb Elementary, Uvalde High School, and Uvalde Junior High.¹⁸⁸ Uvalde CISD features a Migrant Education Program (MEP) designed to meet the special needs of migrant students and "provide an educational experience which can help children reduce the educational disruptions, and other problems that can result form [sic] repeated moves."¹⁸⁹ Uvalde High School is the home of the Coyotes and its mission is to "prepare students to be intellectually, emotionally and socially ready for future challenges."¹⁹⁰ The staff of Uvalde High School work to achieve this mission by setting high expectations, providing a positive environment, working with the community, engaging proactively with students, and including modern technology and pedagogical practices.¹⁹¹

180 State & County QuickFacts. (March 11, 2013). "Uvalde County, Texas," United States Census Bureau. Retrieved April 12, 2013 from: <http://quickfacts.census.gov/qfd/states/48/48463.html>.

181 City of Uvalde. (2011). "History of Uvalde, Texas," City of Uvalde: Uvalde, Texas. Retrieved April 12, from: <http://uvaldetx.com/content/history>.

182 Ibid.

183 Ibid.

184 Ibid.

185 Ibid.

186 Ibid.

187 Ibid.

188 Uvalde Consolidated Independent School District. (N.D.). Uvalde Consolidated Independent School District. Retrieved April 12, 2013 from: <http://ucisd.net/>.

189 Uvalde Consolidated Independent School District. (N.D.). "Migrant program," Uvalde Consolidated Independent School District. Retrieved April 12, 2013 from: http://ucisd.net/apps/pages/index.jsp?uREC_ID=86966&type=d&pREC_ID=164929.

190 Uvalde Consolidated Independent School District. (N.D.). "Mission statement," Uvalde High School. Retrieved April 12, 2013 from: http://uhs.ucisd.net/apps/pages/index.jsp?uREC_ID=95488&type=d&pREC_ID=179867.

191 Ibid.

Victoria County

Victoria County is located southwest of Bexar County near the Texas Gulf Coast. It is considered a county affected by the Eagle Ford Shale play. According to the U.S. Census Bureau, the population of Victoria County in 2012 was 89,269.¹⁹² Victoria is the county seat and is called “the Crossroads of South Texas” because it is nearly equi-distant from Houston, San Antonio, Austin and Corpus Christi.¹⁹³ The city of Victoria was named after the first president of the Republic of Mexico in 1824.¹⁹⁴

Forbes lists Victoria as one of the “Best Small Places for Business and Careers”, as well as fourteenth in job growth.¹⁹⁵ The city is served by two railroads and a port.¹⁹⁶ Victoria is home to The Texas Zoo, which features animal and plant species that are indigenous to the region, along with several museums.¹⁹⁷ Victoria has two colleges: a branch of The University of Houston and Victoria College; a medical center in town serving the seven-county region.¹⁹⁸ Victoria has recently experienced dramatic growth due to the Eagle Ford Shale play. Caterpillar, a large equipment manufacturing company, opened a new plant in Victoria in August 2012 and has drawn new suppliers into town.¹⁹⁹ Housing construction has been booming in Victoria as people have moved there to work in the oil and gas industry or for the Caterpillar plant.²⁰⁰

Victoria Independent School District Serves the Victoria County area. The district’s area has eighteen elementary schools, four middle schools, two high schools, one alternative high school, one advanced high school, one juvenile justice school and one technical high school.²⁰¹ The mission of Victoria ISD is “to provide rigorous, relevant learning and life experiences so that all students contribute positively to society.”²⁰² Robert Jaklich was hired as Victoria ISD’s new Superintendent of Schools and began work on July 1, 2012.²⁰³ This year, Ramona Alvarez, Assistant Principal at Victoria West High School, was elected as the Texas Association of Secondary School Principals’ Region 3 Outstanding Assistant Principal of the Year.²⁰⁴ She will attend the State Awards Dinner and Workshop in Austin in June 2013.²⁰⁵

192 State & County QuickFacts. (March 11, 2013). “Victoria County, Texas,” United States Census Bureau. Retrieved April 12, 2013 from: <http://quickfacts.census.gov/qfd/states/48/48469.html>

193 Roell, C. (N.D.). “Victoria County,” *Handbook of Texas Online*. Texas State Historical Association. Retrieved April 15, 2013 from: <http://www.tshaonline.org/handbook/online/articles/hcv03>

194 Victoria Chamber of Commerce. (2013). “Victoria history,” Victoria, TX Chamber of Commerce. Retrieved April 15, 2013 from: <http://www.victoriachamber.org/victoria-history/>.

195 Forbes. (2013). “Best small places for business and careers,” Forbes.com. Retrieved April 15, 2013 from: <http://www.forbes.com/places/tx/victoria/#>.

196 Victoria Chamber of Commerce. (2013). “Victoria history,” Victoria, TX Chamber of Commerce. Retrieved April 15, 2013 from: <http://www.victoriachamber.org/victoria-history/>.

197 Ibid.

198 Ibid.

199 Crowe, M. (April 13, 2013). “Caterpillar supplier plans to open in Victoria, bring 30 jobs,” *Victoria Advocate*. Victoria Advocate Publishing Co. Retrieved April 15, 2013 from: http://www.victoriaadvocate.com/news/2013/apr/13/mc_ken_garner_041413_206780/.

200 Eye on Housing. (August 28, 2012). “Improving Markets Index: Victoria, TX MSA,” *Victoria Economic Development Corporation*. Retrieved March 25, 2013 from: <http://www.victoriaedc.org/latest-news/national-association-of-home-builders-highlights-victoria-tx-market/>.

201 Victoria Independent School District. (2013). “VISD campus information,” Victoria Independent School District. Retrieved April 15, 2013 from: <http://www.visd.com/campuses/index.asp>.

202 Victoria Independent School District. (2013). “VISD superintendent,” Victoria Independent School District. Retrieved April 15, 2013 from: <http://www.visd.com/superintendent/>.

203 Ibid.

204 Victoria Independent School District. (2013). “VISD administrator named outstanding assistant principal of the year,” Victoria Independent School District. Retrieved April 15, 2013 from: http://www.visd.com/visdNews/2012/091712_APoFYear.asp.

205 Ibid.

Wilson County

Wilson County lies just southeast of Bexar County. It is considered a county affected by the Eagle Ford Shale play. Its county seat is Floresville. According to the U.S. Census Bureau, the estimated population of Wilson County, in 2012, was 44,370.²⁰⁶ The area was originally known for cattle ranching, but in the 1900s and with the growth of the railroad, farming became more popular.²⁰⁷ Manufacturing also became popular, especially after the San Antonio Sewer Pipe Company opened a factory near the Bexar-Wilson County line and when oil was discovered in the area in 1941.²⁰⁸

Floresville had a population of approximately 6,574 in 2011, according to the U.S. Census Bureau.²⁰⁹ Floresville has an annual Peanut Festival that attracts visitors from all over the area and features a Queen Tunaep and King Reboog (“Peanut” and “Goober” backward, respectively).²¹⁰ Floresville is, accordingly, nicknamed the “Peanut Capital of Texas.”²¹¹

Floresville Independent School District (FISD) serves Floresville and Wilson County students. “The mission of the Floresville Independent School District is to develop academic leaders and citizens with character in preparation for the opportunities and challenges of tomorrow.”²¹² Floresville ISD has two elementary schools, one middle school, one high school and one alternative school.²¹³ Floresville ISD has over 4,000 students and offers Aerospace, Culinary Arts, Advanced Placement, and Automotive courses for high school students.²¹⁴ In 2007, a new bond package allowed FISD to provide a new elementary and high school to its student body, along with additional improvements to other facilities.²¹⁵

206 State & County QuickFacts. (March 11, 2013). “Wilson County, Texas,” United States Census Bureau. Retrieved April 15, 2013 from: <http://quickfacts.census.gov/qfd/states/48/48493.html>.

207 Long, C. (N.D.). “Wilson County,” *Handbook of Texas Online*. Texas State Historical Association. Retrieved April 15, 2013 from: <http://www.tshaonline.org/handbook/online/articles/hcw12>.

208 Ibid.

209 State & County QuickFacts. (March 11, 2013). “Floresville city, Texas,” United States Census Bureau. Retrieved April 15, 2013 from: <http://quickfacts.census.gov/qfd/states/48/4826160.html>.

210 Floresville Peanut Association Festival. (2011). “Floresville Peanut Festival history,” Floresville Peanut Festival. Retrieved April 15, 2013 from: <http://floresvillepeanutfestival.org/history.php>.

211 Long, C. (N.D.). “Wilson County,” *Handbook of Texas Online*. Texas State Historical Association. Retrieved April 15, 2013 from: <http://www.tshaonline.org/handbook/online/articles/hcw12>.

212 Floresville Independent School District. (N.D.). “About Us,” Floresville Independent School District: Preparing You for a Prosperous Life. Retrieved April 15, 2013 from: http://www.fisd.us/apps/pages/index.jsp?uREC_ID=192443&type=d&pREC_ID=397639

213 Floresville Independent School District. (N.D.). Floresville Independent School District: Preparing You for a Prosperous Life. Retrieved April 15, 2013 from: http://www.fisd.us/apps/pages/index.jsp?uREC_ID=192443&type=d&pREC_ID=397639.

214 Floresville Independent School District. (N.D.). “About us,” Floresville Independent School District: Preparing You for a Prosperous Life. Retrieved April 15, 2013 from: http://www.fisd.us/apps/pages/index.jsp?uREC_ID=192443&type=d&pREC_ID=397641.

215 Ibid.

Zavala County

Zavala County is located south of Uvalde County and west of Frio County. It is considered to be a county affected by the Eagle Ford Shale play. The U. S. Census Bureau estimates the 2012 population of Zavala County to have been 11,961.²¹⁶

The county was named after one of the signers of the Texas Declaration of Independence, Lorenzo de Zavala.²¹⁷ Native species such as longhorn cattle and mustangs roamed the area, and area ranchers raised cattle and sheep.²¹⁸ In 1917 spinach became a crop of choice and Zavala County began to produce more fruit and vegetable agriculture streams, rather than focusing on livestock.²¹⁹ During World War II, Zavala County's county seat of Crystal City became home to a German and Japanese internment camp.²²⁰ This was the largest internment camp directed by the Immigration and Naturalization Service and the Department of Justice during that time.²²¹ The camp closed in 1947 and was the last of its kind to do so.²²²

Crystal City is known as the "Spinach Capital of the World" and holds an annual Spinach Festival.²²³ A statue of Popeye stands in front of the Crystal City's city hall as an emblem of the town's pride in its spinach heritage.²²⁴

Crystal City Independent School District (CCISD) has four campuses.²²⁵ Its mission is that CCISD "working in partnership with the community, has education as its top priority. By providing a safe and positive learning environment, all students will develop the competencies needed to become life-long learners and responsible, conscientious members of society."²²⁶ The CCISD's goals are:

"to have positive and consistent student discipline strategies; to achieve an increase in awareness and community involvement in district initiatives; to work on continuing to improve technology services in facilitating instruction and effectiveness of district operations; to gain effective instructional delivery through on-going staff development; to sustain continued improvement in student performance."²²⁷

216 State & County QuickFacts. (March 11, 2013). "Zavala County, Texas," United States Census Bureau. Retrieved April 15, 2013 from: <http://quickfacts.census.gov/qfd/states/48/48507.html>

217 Ochoa, R. "Zavala County," *Handbook of Texas Online*. Texas State Historical Association. Retrieved April 15, 2013 from: <http://www.tshaonline.org/handbook/online/articles/hcz02>.

218 Ibid.

219 Ibid.

220 Ibid.

221 221 Brosveen, E. "World War II internment camps," *Handbook of Texas Online*. Texas State Historical Association. Retrieved April 15, 2013 from: <http://www.tshaonline.org/handbook/online/articles/quwby>.

222 Ibid.

223 Texas Escapes. (February 14, 2009). "Crystal City, Texas," *Texas Escapes Online Magazine*. Blueprints for Travel, Inc. Retrieved April 15, 2013 from: <http://www.texasescapes.com/SouthTexasTowns/Crystal-City-Texas.htm>.

224 Ibid.

225 Crystal City Independent School District. (2013). Retrieved April 15, 2013 from: <http://www.crystalcityisd.org/>.

226 Crystal City Independent School District. (2013). Retrieved April 15, 2013 from: <http://www.crystalcityisd.org/>.

227 Crystal City Independent School District. (2013). Retrieved April 15, 2013 from:

http://www.crystalcityisd.org/apps/pages/index.jsp?uREC_ID=89078&type=d&pREC_ID=220934&hideMenu=1.

SECTION IV

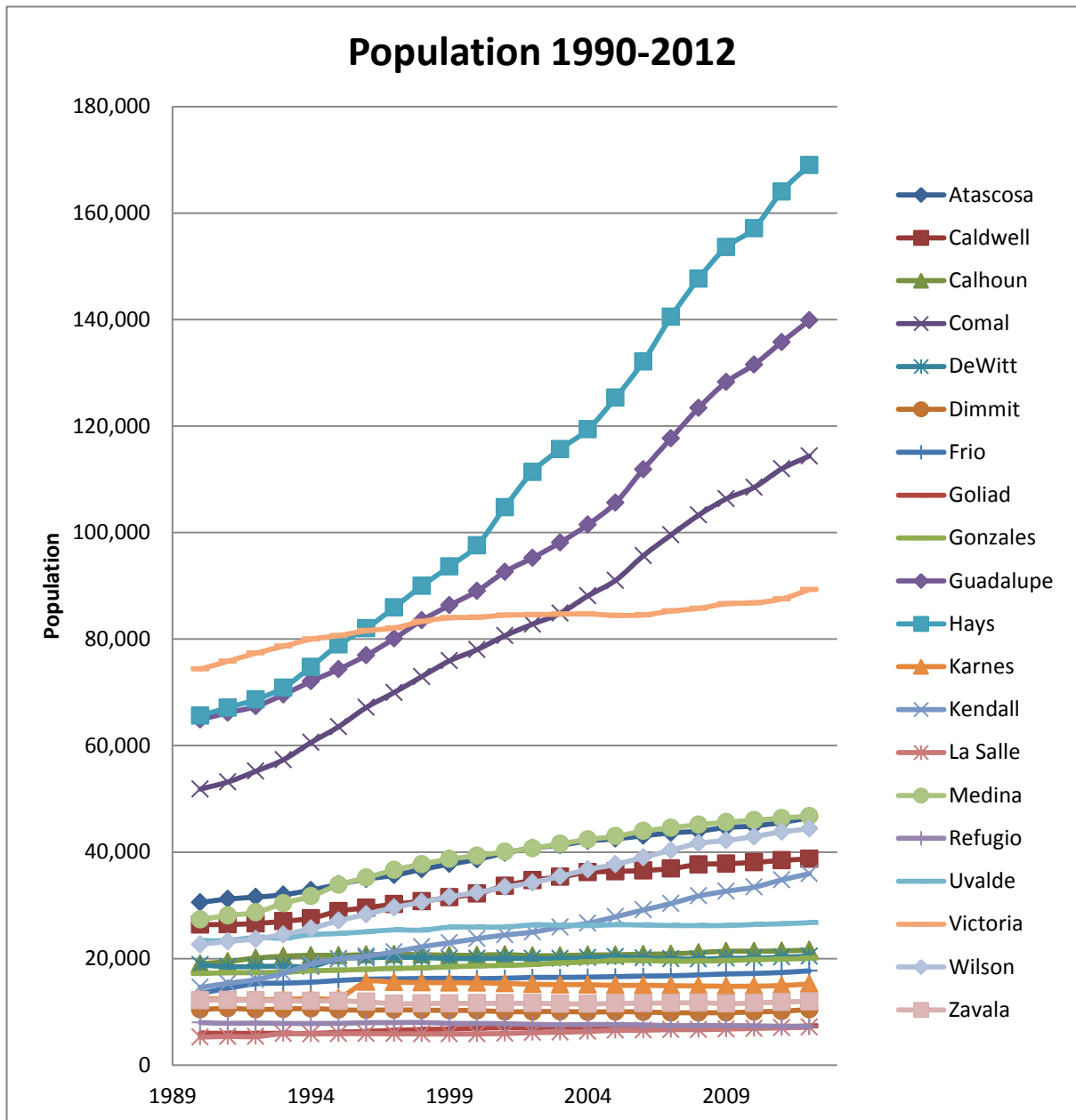
This section discusses the study and findings. It also covers information on how to read the data and graphics related to the data tests. A conclusion follows.

Discussion

This study has looked at the conceptual and empirical analysis of characteristics and situations related to population in the Region L counties, in order to gain some statistical backdrop against which to make decisions concerning potential population changes those counties face in the next few decades. Region L represents an area with one of the highest rates of growth in the nation. Its counties face many choices, reasons for planning, and the need to update information, as well as systems that document and handle information related to this growth. In order to make sense of the number side of this study, it is important that each county understand the context of results and the rational choices that can be made from examining the data, as well as the circumstances unique to each county. This section discusses some of that to provide an overview of the study and to pull out some information to aid in planning and decision-making for Region L counties.

The graph below shows the “historic” population numbers for the Region L counties from 1990 to 2012 that were used to calculate a baseline. Multipliers and trends for an autoregressive method of projection used numbers from 2000 to 2012. The “event” calculations used population numbers from 2008 onward. When looking at the “forecast” projections, this historic data is pictured as a dotted line going up to the point where the forecast begins. For some counties, the period preceding the EFS activities saw a general decline in population, while some saw general growth due to adjacency in the Austin-San Antonio-Houston trade corridor. It is interesting to think that with expansion in counties outlying that corridor, some future trajectories of population may see a chart similar to that shown below, but with many county trend lines going upward, rather than being flat or downward. The table of historic population numbers follows.

Table 30 and chart 10, below, compile and list the 2050 projection numbers from the State Demographer scenarios, the historic and event projections for employment and school enrollment, and the housing statistic projections. Cells in yellow show values that are lower than those of the group of scenarios. Cells in green show values that are not different; they fall within the scenario group range for 2050 population. The red cells show values that are substantially higher than those of the scenario group.



Graph 8: Population 1990-2010; source: SARA Region L Population Forecast General.xls\pop 90-12 graph all

Table 29: Population 1990-2010; source: SARA Region L Population Forecast General.xls \pop 90-12 graph all

Year	Population 1990-2012																				
	Atascosa	Bexar	Caldwell	Calhoun	Comal	DeWitt	Dimmit	Frio	Goliad	Gonzales	Guadalupe	Hays	Karnes	Kendall	La Salle	Medina	Refugio	Uvalde	Victoria	Wilson	Zavala
2012	46,446	1,785,704	38,734	21,609	114,384	20,465	10,461	17,702	7,351	20,045	139,841	168,990	15,233	35,956	7,109	46,765	7,259	26,752	89,269	44,370	11,961
2011	45,579	1,756,153	38,442	21,442	111,963	20,255	10,118	17,400	7,243	19,904	135,757	164,050	14,946	34,781	7,001	46,367	7,291	26,535	87,545	43,789	11,849
2010	44,911	1,714,773	38,066	21,381	108,472	20,097	9,996	17,217	7,210	19,807	131,533	157,107	14,824	33,410	6,886	46,006	7,383	26,405	86,793	42,918	11,677
2009	44,623	1,685,628	37,829	21,388	106,350	20,048	9,848	17,120	7,157	19,628	128,265	153,619	14,805	32,655	6,771	45,605	7,410	26,223	86,635	42,181	11,544
2008	43,947	1,651,709	37,671	21,127	103,272	19,902	9,833	16,939	7,164	19,538	123,398	147,674	14,867	31,754	6,653	45,131	7,430	26,206	85,762	41,657	11,725
2007	43,611	1,615,210	36,906	20,888	99,540	19,961	9,845	16,776	7,142	19,512	117,667	140,480	14,900	30,330	6,675	44,577	7,414	26,217	85,261	40,354	11,657
2006	43,059	1,573,935	36,533	20,839	95,637	20,108	9,972	16,720	7,121	19,633	111,878	132,111	14,985	29,134	6,549	43,936	7,548	26,301	84,528	39,007	11,642
2005	42,495	1,529,270	36,388	20,715	91,018	20,342	10,031	16,618	7,070	19,656	105,585	125,302	14,967	27,849	6,542	42,977	7,601	26,368	84,453	37,706	11,565
2004	42,109	1,500,919	36,200	20,692	88,119	20,176	9,964	16,532	7,071	19,370	101,495	119,395	15,109	26,650	6,322	42,363	7,630	26,205	84,718	36,721	11,512
2003	41,306	1,469,623	35,330	20,575	84,837	20,034	10,075	16,477	7,135	19,181	98,137	115,665	15,119	25,892	6,169	41,549	7,563	26,258	84,674	35,458	11,513
2002	40,767	1,446,755	34,715	20,550	82,797	20,015	10,042	16,467	7,051	18,882	95,246	111,397	15,178	24,975	6,098	40,707	7,665	26,309	84,573	34,254	11,616
2001	39,828	1,419,020	33,654	20,762	80,630	20,066	10,030	16,315	7,020	18,714	92,626	104,739	15,340	24,433	5,934	40,053	7,765	25,939	84,491	33,408	11,596
2000	38,628	1,392,931	32,194	20,647	78,021	20,013	10,248	16,252	6,928	18,628	89,023	97,589	15,446	23,743	5,866	39,304	7,828	25,926	84,088	32,408	11,600
1999	37,736	1,378,688	31,485	20,634	75,919	20,032	10,276	16,309	6,791	18,467	86,332	93,622	15,468	22,967	5,829	38,697	7,834	25,901	83,984	31,631	11,590
1998	36,755	1,359,906	30,763	20,754	72,954	20,193	10,328	16,262	6,678	18,248	83,503	89,981	15,503	22,220	5,864	37,734	8,001	25,356	83,326	30,584	11,578
1997	35,650	1,340,235	30,208	20,791	69,957	20,258	10,374	16,204	6,546	18,166	80,084	85,902	15,575	21,256	5,877	36,644	7,981	25,389	82,080	29,598	11,534
1996	34,934	1,321,863	29,546	20,745	67,170	20,153	10,321	16,132	6,318	17,998	76,944	82,010	15,611	20,473	5,903	35,203	7,955	25,045	81,573	28,319	11,869
1995	33,962	1,303,692	28,905	20,608	63,553	19,973	10,393	15,898	6,159	17,832	74,333	78,956	12,609	19,903	5,907	33,838	7,844	24,721	80,646	27,112	12,035
1994	32,850	1,280,695	27,567	20,622	60,579	18,533	10,628	15,563	5,925	17,700	72,060	74,779	12,513	18,939	5,864	31,725	7,819	24,495	79,974	25,647	12,037
1993	31,996	1,255,484	27,010	20,428	57,328	18,578	10,512	15,409	5,974	17,468	69,563	70,871	12,346	17,230	5,913	30,368	7,828	23,850	78,640	24,503	12,068
1992	31,540	1,231,743	26,600	20,098	55,168	18,518	10,468	15,271	5,952	17,356	67,355	68,635	12,304	16,060	5,351	28,668	7,891	23,947	77,352	23,672	12,158
1991	31,191	1,206,017	26,405	19,453	53,169	18,480	10,646	14,442	5,971	17,341	66,166	67,125	12,368	15,358	5,380	28,110	7,843	23,422	75,820	23,244	12,204
1990	30,533	1,185,394	26,392	19,053	51,832	18,840	10,433	13,472	5,980	17,205	64,873	65,614	12,455	14,589	5,254	27,312	7,976	23,340	74,361	22,650	12,162

Table 30: Comparison of all projections; source: SARA Region L Population Forecast General.xls\comparison alldata

Comparison of all Projections								
County	StDmg 0	StDmg 0.5	StDmg 1	POPx-SE	POPx-SE 6yr	POPx-Labor	POPx-Labor5yr	POPx-HU
Atascosa	59,053	75,481	87,117	53,631	58,293	72,962	63,054	74,791
Bexar	2,195,644	2,695,668	3,180,782	3,119,331	3,102,539	2,589,924	3,195,403	3,010,225
Caldwell	43,148	64,014	92,471	39,973	53,597	48,627	69,592	66,573
Calhoun	25,352	32,276	38,881	21,919	17,848	23,253	45,486	26,114
Comal	112,457	192,808	317,376	276,088	262,619	223,647	112,899	238,301
Dewitt	22,003	22,216	21,770	17,112	28,103	28,339	41,717	23,501
Dimmit	14,414	12,825	10,042	8,345	10,493	16,031	69,171	
Frio	22,136	24,488	26,160	17,285	19,700	22,194	62,547	24,724
Goliad	6,936	8,345	10,545	6,500	9,620	11,752	11,927	
Gonzales	27,079	28,330	28,239	21,760	34,205	32,305	30,586	26,217
Guadalupe	145,771	258,289	424,870	285,152	280,406	257,535	329,633	279,012
Hays	237,144	474,802	952,790	355,394	283,073	338,242	350,421	353,058
Karnes	15,735	15,697	16,609	9,140	20,290	16,380	25,308	18,902
Kendall	33,669	56,429	90,187	62,451	57,657	66,646	47,859	77,549
La Salle	9,178	9,987	10,835	4,470	8,765	11,799	42,850	
Medina	52,341	70,896	89,271	58,548	62,759	85,849	69,863	84,770
Refugio	8,793	8,119	6,888	3,961	3,413	12,510	16,282	
Uvalde	37,440	36,257	31,631	19,338	21,024	32,526	43,426	36,684
Victoria	111,013	109,785	101,747	73,656	115,588	115,176	130,049	116,413
Wilson	43,786	71,683	108,349	69,566	58,166	82,109	79,905	83,081
Zavala	19,410	17,521	13,540	12,011	12,680	6,398	37,238	

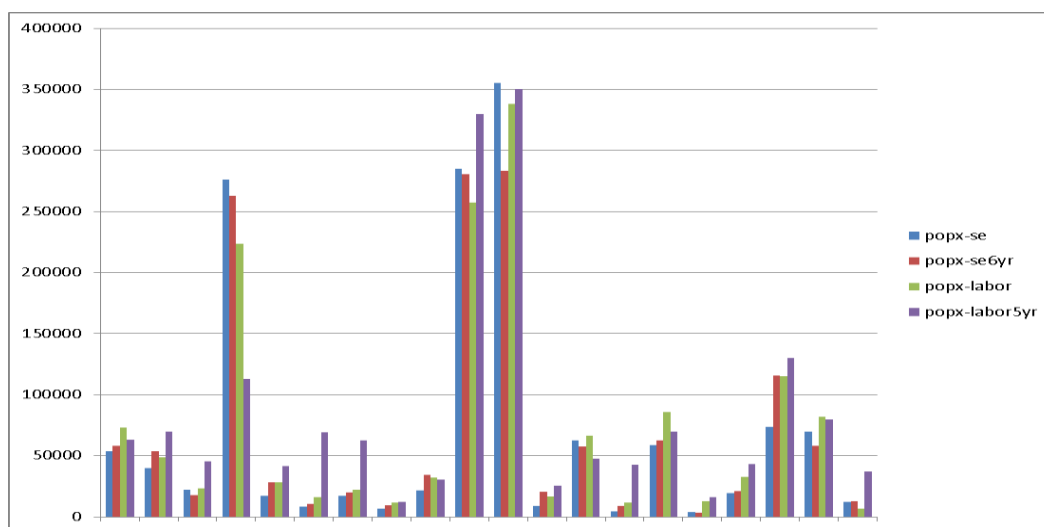
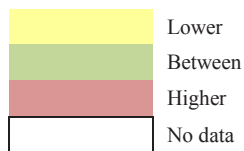


Chart 10: Comparison of all Projections; source: SARA Region L Population Forecast General.xls\comparison alldata

When looking at this data it is important to understand that these numbers are not “real”, but are “virtual”; they are projected abstractions based on current trends and formulas based on historic trends. When deciphering the comparison table values, the linear forecasts, and the population projections, in relation to which best describes a future profile for a county, it is important to assess how realistic, in terms of both historic and current events, as well as how practical the projected numbers actually are. Below is some comment on the comparison table, in terms of the scenario projections, to help with some perspective concerning choosing or using a data set for population projection based planning.

Note also that the State is currently working on updated projections. Any new information will have to be compared with these results, especially in light of the 2050 target population numbers used here, the ranges between them, and the linear shape and direction for each scenario.

For the graphs of the State Demographer Scenarios, see: the Appendix. The graphs of the projections for each county are also in the County Breakout Brochure. The graphs show the normal migration scenario “0” as blue, the conservative scenario “.5” as red and the aggressive scenario “1” as green.

In the comments below, where appropriate, scenario projection numbers for 2050 are noted when they are close to the projected numbers from those calculated from this study’s data sets. Each county can choose to request a recount from the U.S. Census and provide that request documentation as part of their justification to TWDB for the use of alternate numbers for water planning purposes. Although TWDB recommends the use of the conservative (.5) scenario, counties have the choice of requesting that any of the three scenarios (normal migration: 0, conservative migration: .5, aggressive migration: 1) be used for their documentation. Some data from this study safely fell into a range between the target numbers of scenarios. It is noted that some scenarios appear problematic, in relation to high target numbers, based on some of this study’s data sets. Counties also have the option of noting that projection rates of change are either significantly and/or substantially different. This can be used as a justification for use of data other than that offered by the State Demographer. When looking at the EMP-, SE- and HU-based forecast graphs and charts, sudden rate changes can be seen as a bubble, or as a wide variation between two charted data types. For example, the rate of SE and POP should be about the same, as seen for Guadalupe and Hays Counties in the chart below (see arrow). Counties such as La Salle show a huge difference between percent change of SE and that of POP over the event period (see bracket). In fact, SE goes downward in percent change. That is what would be expected if there was a much larger influx of single or family-less people moving into that area. EFS workers fit that description.

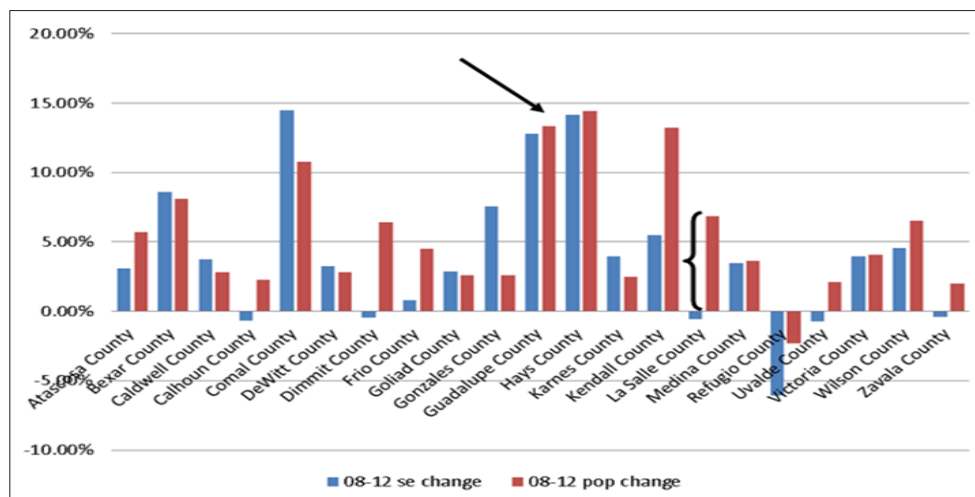


Chart 11: Percent Change Historic 2008-2012; source: SARA Region L Population Forecast III School Enrollment.xls

For Frio County a bubble showing significant and substantial change is apparent on the historic portion of the projection, based on historic EMP (see bracket on graph below). Some changes can be substantial, while a significant change is a statistical value that precludes the result from occurring due to chance; usually designated with a 95% confidence. Statistical significance was not calculated in this study due to time/data limitations and methodology used. But it can be inferred due to results calculated, such as the 65% change calculated in Dimmit County’s labor force for the event period. Substantial changes can be verified with ratio calculations, as was done in this study.

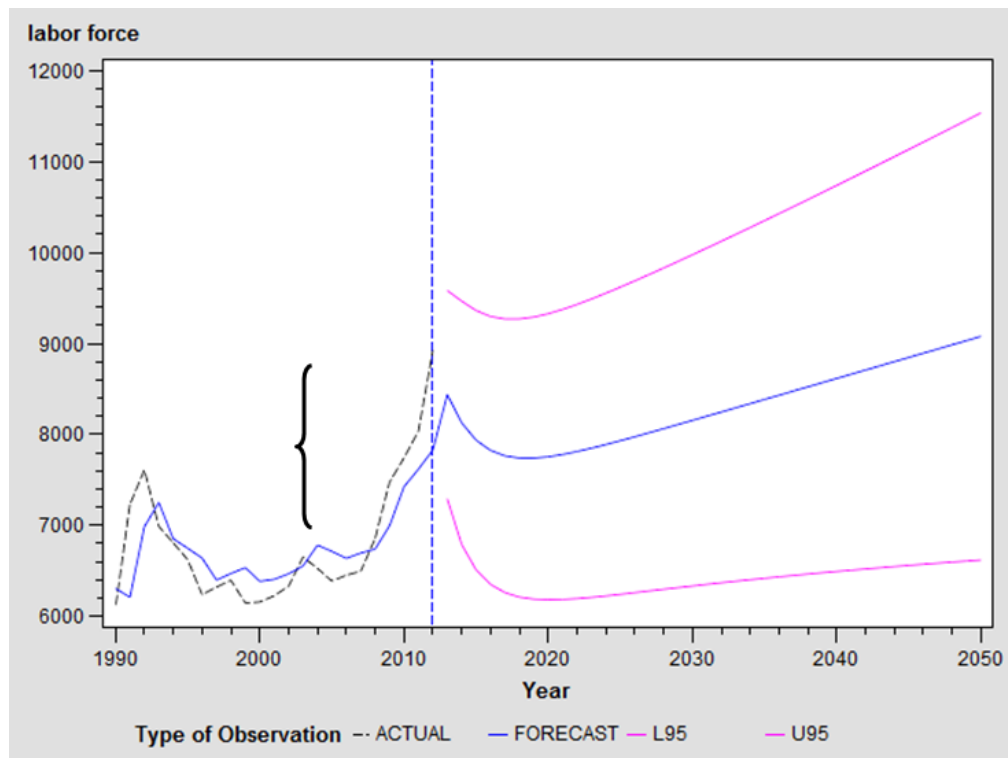


Figure 33: Frio Forecast based on Historic EMP

Comments on findings and results

For counties that did not have HU data suitable for calculation or for federal census records, possible governance strategies can include zoning and records related to development. Lack of data led to underreporting related to many types of counts. Partnerships with utilities and state departments for documentation and ease of access to residential, labor and educational data can help with planning and future study efforts.

Counties where from study population projection data shows vast differences from state population projections are titled with “?”; some of these county numbers fall within ranges of two projections, some fall outside of projections. When there is no difference (ND) between study and StDmg projection ranges, data sets resulting in lower or higher targets are noted. County information listed in red reflects findings from this study that suggest the need for alternative data concerning population projections.

Comments in the listing below include: relational geographic situation (in quotations below, see legend) that has an influence on growth patterns due to trade and population settlement, along with possible recount request note; comparison of data to the 2050 population projected by the State Demographer (rounded to the numerical 1000 as “k”); range scenario (normal migration: 0, conservative migration: .5, aggressive migration: 1); *recommendation on StDmg projection follows:

(?) County: “Geography”; (recount); data type Lower, no difference, Higher; Suggested StDmg Scenarios
*recommendation on StDmg projections

Summary by County

Atascosa: “EFS”; historic and event SE is lower, and all other show no difference; 0 - 75K and .5 - 59K

Bexar: “regional urban anchor”; **recount**; event labor high (3,195k), all other no difference; 1 – 3180K

Caldwell: “north corridor”; historic SE low, all other no difference; .5 – 64K, 1 – 92k

? Calhoun: “coastal”, **recount**; SE and historic labor low, HU ND, event labor high (45k); 0 – 25k, 1 – 38k

Comal: “north corridor”; all ND, but event labor close to 0 scenario, SE (historic 276-event 262k) and historic labor (223k) fall between: .5 – 192k, 0 – 317k

? Dewitt: “EFS”; **recount**; historic SE lower, all others higher: event SE 28k, event labor 41k; 0, .5 – 22k;
*StDmg projections not recommended, due to downward curvilinear and low estimations

? Dimmit: “EFS”; **recount**; historic SE lower, event SE ND, Labor higher (historic 16-event 69k), HU no data; 0 – 14k is far under the labor-based target
*StDmg projections not recommended, due to downward curvilinear and low estimations

? Frio: “EFS”; **recount**; SE low, historic labor and HU ND, event labor high (62k); .5 – 24k, 1 – 26k; but
*StDmg projections curve downward

? Goliad: “south corridor”, **recount**; historic SE low, event SE ND, HU no data, labor high (11k); 1 – 10k;
*StDmg projections not recommended, due to downward curvilinear and low estimations

? Gonzales: “north corridor”; **recount**; historic SE and HU low, event SE (34k) and labor high (historic 32k – event 30k); .5 – 28k

Guadalupe: “north corridor; recount; all ND, however, SE (historic 280k – event 285k) and labor (historic 257k-event 329k) fall between .5 – 258k and 1 – 424k

*StDmg projection ranges are wide, aggressive almost 3 times the normal, may not be realistic

Hays: “north corridor; all ND, SE (355-283K) and labor (338-350k); .5 – 474k;

*StDmg projection ranges are wide, aggressive (~ 1000k) almost 5 times current may not be realistic

? Karnes: “EFS”; recount; SE low, event SE high (20k), labor close & high (historic 16k – event 25k); none; *StDmg projections not recommended, due to downward curvilinear and low estimations

Kendall: “north corridor”; all ND, .5 – 56k, 1 – 90k

? La Salle: “EFS”; recount; SE low, HU no data, labor high (historic 11k – event 42k); 1 – 10k,

*StDmg projections not recommended, due low estimations

Medina: “EFS”; all ND, SE (event 62k), labor (historic 85k – event 69k); .5 – 70k, 1 – 89k

? Refugio: “coastal”; recount; SE low, labor high (historic 12k – event 16k), none;

*StDmg projections not recommended, due to downward curvilinear and low estimations

? Uvalde: “EFS”; recount; SE low, historic labor ND, event labor (43k); 0 – 37k

*StDmg projections usable range, but downward curvilinear and possible low estimations

? Victoria: “south corridor”; recount; historic SE low, all other high, event SE (115k), labor (historic 115-event 130k); 0 – 111k

*StDmg projections not recommended, due to downward curvilinear and low estimations

? Wilson: “EFS”; recount; all ND labor (historic 82k– event 79k); .5 – 71k, 1 – 108k

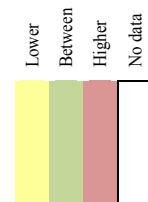
*StDmg projection ranges are wide

? Zavala: “EFS”; recount; SE and historic labor low, event labor high (37k), HU no data; 0 – 19k

To get a feel for population relative to the county and whether a projection might be reasonable, aside from a pure mathematical calculation, looking at population density can be helpful. For counties that have traditionally been sparsely populated and where infrastructure is limited, or for counties that already have a high urban density and infrastructure always seems in development, envisioning the increased demand, manpower, and location of housing, services, and development can be facilitated by population density information. General population density data based on the projected 2050 populations is in a table below.

Table 31: Population Density Comparisons; source: SARA Region L Population Forecast II Housing Units.xls \population density

Blue Cnty is EFS+2	Population Density Comparisons																		
	Historic						Event						State Demographer						
	2050 EMP		2050 BP HU		2050 SE		2050 EMP		2050 VR HU		2050 SE		2050 0.0		2050 0.5		2050 1.0		
County Pop	Pop Density	County Pop	Pop Density	County Pop	Pop Density	County Pop	Pop Density	County Pop	Pop Density	County Pop	Pop Density	County Pop	Pop Density	County Pop	Pop Density	County Pop	Pop Density	County Pop	Pop Density
Atascosa	72,962	59.22	74,791	60.70	53,631	43.53	63,054	51.18	N/A	0.00	47.31	58,293	47.31	75,481	61.26	87,117	70.70	59,053	47.93
Bexar	2,589,924	2077.22	3,010,225	2414.31	3,119,331	2501.82	3,195,403	2562.83	N/A	0.00	2488.35	3,102,539	2488.35	2,695,668	2162.03	3,180,782	2551.11	2,195,644	1760.99
Caldwell	48,627	89.11	66,573	121.99	39,973	73.25	69,592	127.52	N/A	0.00	98.21	53,597	98.21	64,014	117.30	92,471	169.45	43,148	79.07
Calhoun	23,253	45.39	26,114	50.97	21,919	42.78	45,486	88.79	N/A	0.00	34.84	17,848	34.84	32,276	63.00	38,881	75.89	25,352	49.49
Comal	223,647	398.34	238,301	424.44	276,088	491.74	112,899	201.09	N/A	0.00	467.75	262,619	467.75	192,808	343.41	317,376	565.28	112,457	200.30
DeWitt	28,339	31.17	23,501	25.85	17,112	18.82	41,717	45.88	N/A	0.00	30.91	28,103	30.91	22,216	24.44	21,770	23.94	22,003	24.20
Dimmit	16,031	12.05		0.00	8,345	6.27	69,171	51.97	N/A	0.00	7.88	10,493	7.88	12,825	9.64	10,042	7.55	14,414	10.83
Frio	22,194	19.59	24,724	21.82	17,285	15.26	62,547	55.20	N/A	0.00	17.39	19,700	17.39	24,488	21.61	26,160	23.09	22,136	19.54
Goliad	11,752	13.77		0.00	6,500	7.62	11,927	13.97	N/A	0.00	11.27	9,620	11.27	8,345	9.78	10,545	12.35	6,936	8.13
Gonzales	32,305	30.26	26,217	24.55	21,760	20.38	30,586	28.65	N/A	0.00	32.03	34,205	32.03	28,330	26.53	28,239	26.45	27,079	25.36
Guadalupe	257,535	362.14	279,012	392.34	285,152	400.98	329,633	463.53	N/A	0.00	394.30	280,406	394.30	258,289	363.20	424,870	597.45	145,771	204.98
Hays	338,242	498.98	353,058	520.83	355,394	524.28	350,421	516.94	N/A	0.00	417.59	283,073	417.59	474,802	700.43	952,790	1405.56	237,144	349.84
Karnes	16,380	21.83	18,902	25.19	9,140	12.18	25,308	33.73	N/A	0.00	27.04	20,290	27.04	15,697	20.92	16,609	22.14	15,735	20.97
Kendall	66,646	100.61	77,549	117.07	62,451	94.27	47,859	72.25	N/A	0.00	87.04	57,657	87.04	56,429	85.18	90,187	136.14	33,669	50.83
La Salle	11,799	7.92		0.00	4,470	3.00	42,850	28.78	N/A	0.00	5.89	8,765	5.89	9,987	6.71	10,835	7.28	9,178	6.16
Medina	85,849	64.66	84,770	63.84	58,548	44.10	69,863	52.62	N/A	0.00	47.27	62,759	47.27	70,896	53.40	89,271	67.23	52,341	39.42
Refugio	12,510	16.24		0.00	3,961	5.14	16,282	21.14	N/A	0.00	4.43	3,413	4.43	8,119	10.54	6,888	8.94	8,793	11.42
Uvalde	32,526	20.90	36,684	23.57	19,338	12.42	43,426	27.90	N/A	0.00	13.51	21,024	13.51	36,257	23.29	31,631	20.32	37,440	24.05
Victoria	115,176	130.51	116,413	131.91	73,656	83.46	130,049	147.36	N/A	0.00	130.98	115,588	130.98	109,785	124.40	101,747	115.29	111,013	125.79
Wilson	82,109	101.75	83,081	102.95	69,566	86.20	79,905	99.02	N/A	0.00	72.08	58,166	72.08	71,683	88.83	108,349	134.26	43,786	54.26
Zavala	6,398	4.93		0.00	12,011	9.25	37,238	28.68	N/A	0.00	9.77	12,680	9.77	17,521	13.49	13,540	10.43	19,410	14.95



Reading the graphs and charts

The charts of the State Demographer’s scenario projections for each county are listed in the section for that county. It is important to realize that the key for the projection lines is blue for normal “0” migration rate, red for conservative migration rate “.5” and green for aggressive migration rate “1”. For some counties that had high rates of historical population decline, the aggressive would show a general negative slope going into 2050, as illustrated by the chart for Dimmit, below (see arrow on figure). For Dimmit, the normal and conservative have higher ending populations projected than aggressive, as that scenario picked up on the general population decline. In contrast, for Hays, which has demonstrated a very high rate of population increase historically, the conservative actually shows a higher ending population projected than that of a normal rate. The aggressive shows a projected population of close to one million in 40 years—which may be unrealistic when thinking about the amount of housing and infrastructure that would be needed. (see arrow on figure).

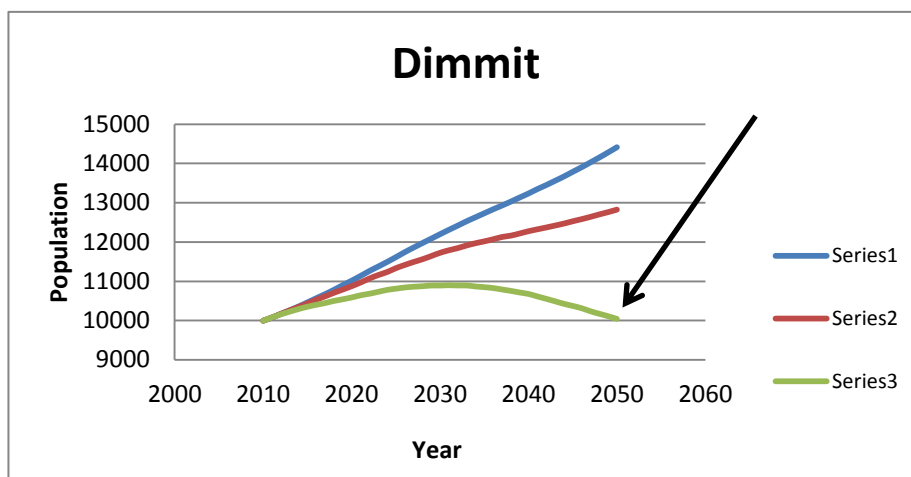


Figure 34: "Aggressive Scenario" showing decline for Dimmit County; source: State Demographer Scenarios

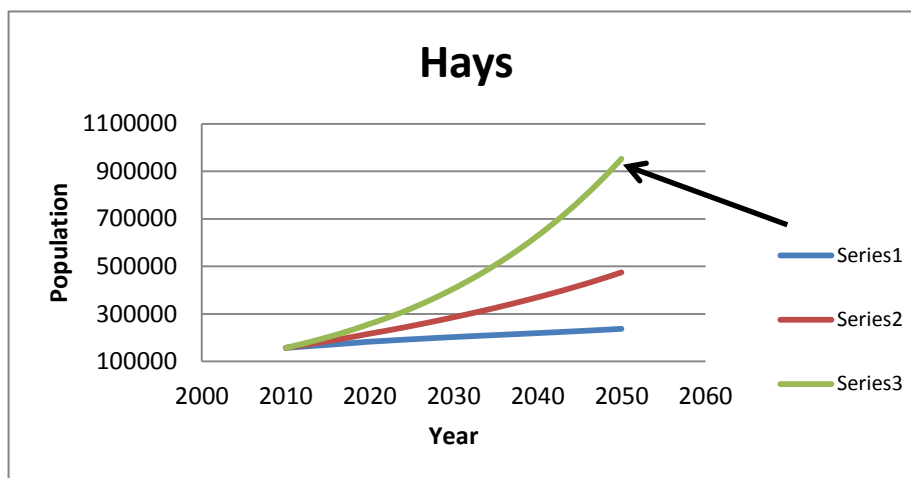


Figure 35: "Aggressive Scenario" showing an increase for Hays County; source: State Demographer Scenarios

Likewise, when “reading” the forecasting graphs it is important to understand how the autoregressive formula uses the historic or event dataset to build the forecast. Dips, bubbles, and sudden increases or

decreases may be seen by the times series formula as an outlier and may be smoothed over. This leads to a less than realistic slope or direction of the linear trend reported. Also, such a change may lead to the confidence interval, or range in which future predicted points are estimated to fall, being larger than would be desired. A tight confidence interval and a realistic treatment of dips and bubbles in the data are important to consider when choosing a “best fit” model for prediction. Assessing practical and realistic circumstances is also important, as data may say one thing, but physically, a numerical result just is not likely.

As an example, in graphs for Hays County based off of EMP and SE, the historic EMP-based trend is very tight, with a narrow confidence interval and a steep upward slope. The historic data leading into the projection is fairly stable around the trend line. The EMP-based event graph mirrors the slope, although the confidence interval is wider (see arrows on figures).

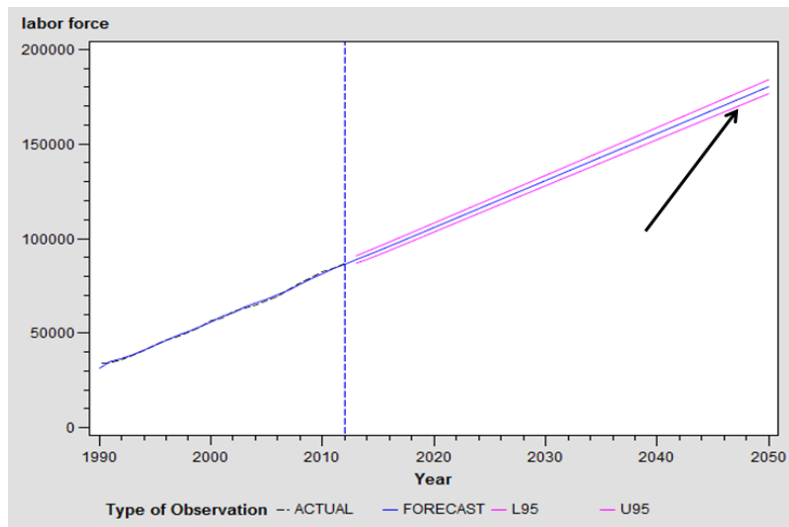


Figure 36: Hays, Historical EMP, narrow confidence interval

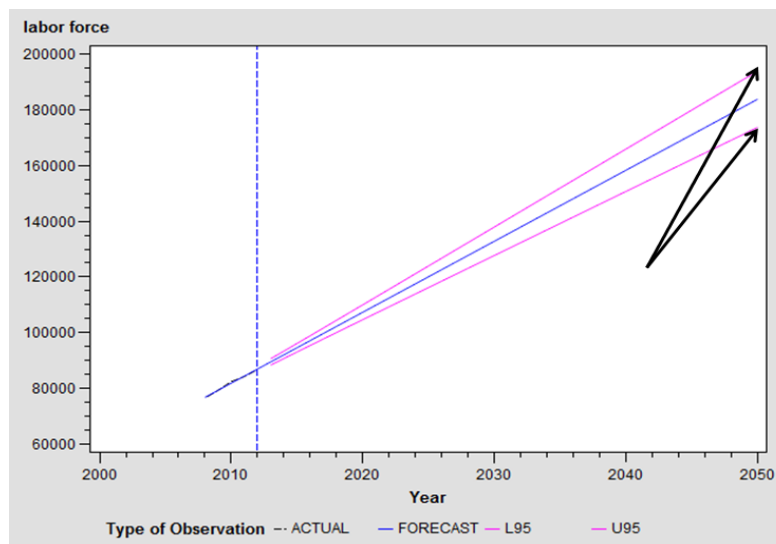


Figure 37: Hays, Event EMP, wider confidence interval

On the Hays graph based off of SE, an anomaly in enrollment is seen differently between the historic and event forecasts. Historically, the dip (see arrow on graph) is smoothed out, while in the event it leads to a wide confidence interval (see bracket on graph). Also, the slope of the line is not as steep as in historic SE and in both EMP graphs, so the SE event is probably not the best choice as a predictive model. The confidence interval is tighter in historic EMP for hays, so that is more likely to be a better choice of model. However, it is also important to assess the target predicted population for comparison, as done above with the comparison table. Graphs show estimated values that may not accurately reflect the numerical ranges of the actual projections, due to labeling technicalities of the graphs' axis.

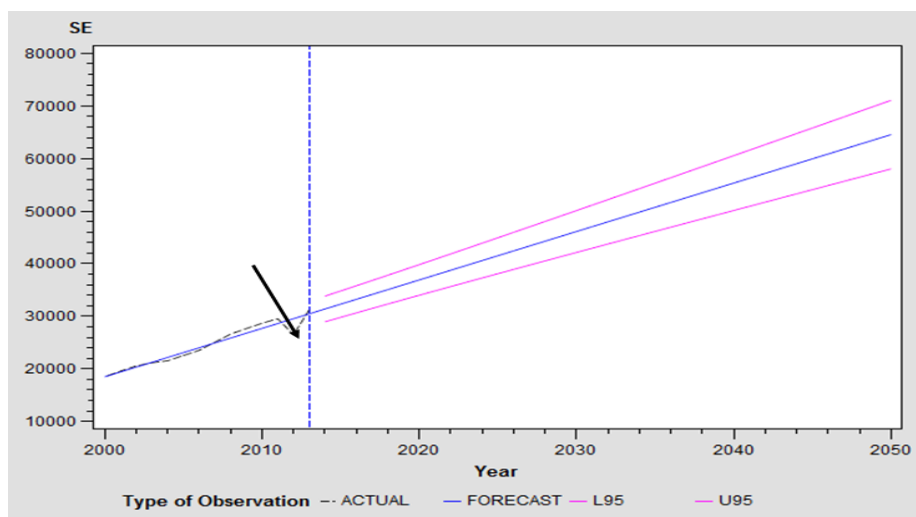


Figure 38: Hays Historic SE, anomaly smoothed for narrow confidence interval

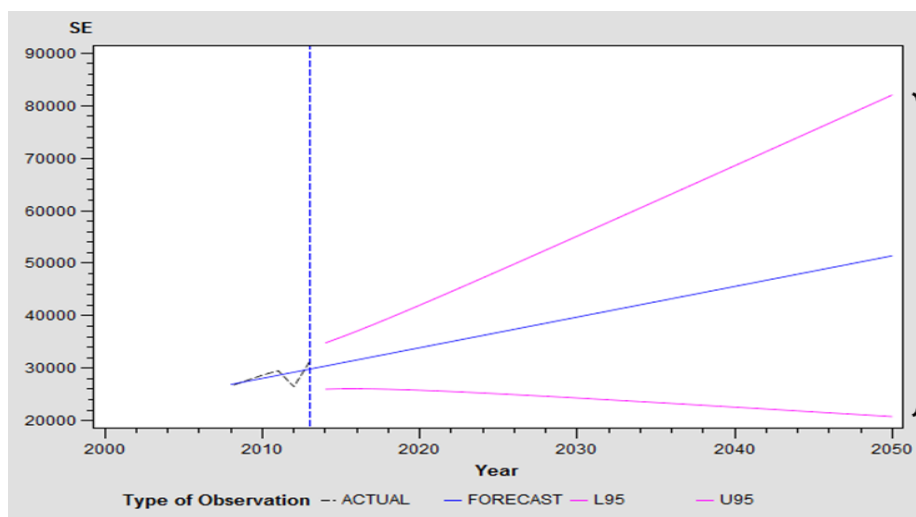


Figure 39: Hays Event SE, wide confidence interval, based on anomaly

In historic EMP for Dimmit, the smoothing of the event bubble (see arrow on graph) can be seen, where the software saw the bubble as an outlier that needed to be virtually erased. This also led to a very wide confidence interval. The event trend, though, uses that increase based off of EMP to draw a slope that reflects what we know anecdotally has been happening in that area. The slope is positive and the confidence interval is tighter.

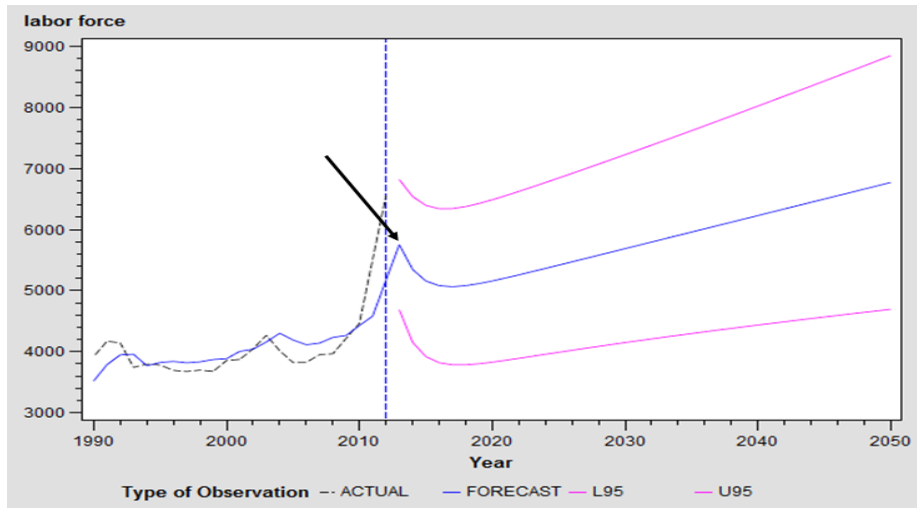


Figure 40: Dimmit Historic EMP, bubble smoothed

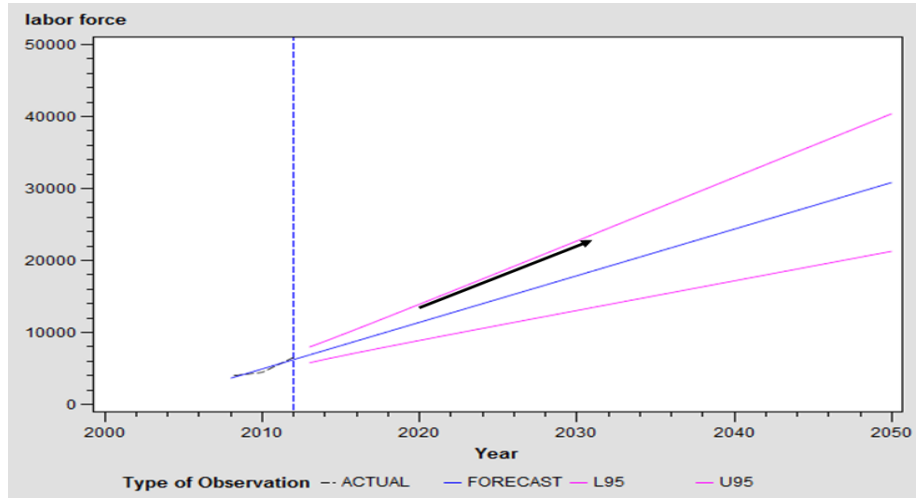


Figure 41: Dimmit Event EMP, bubble not smoothed

Related to SE, the historic graph shows a downward trend (see solid arrow on graph) with the bubble smoothed out, but still affecting a wide confidence interval. The event based graph shows and even wider confidence interval, but the slope has flattened (see solid arrow on graph) and is no longer negative. While the slope here may be more realistic, the wide confidence interval is a less likely choice than that based on event EMP. Event EMP seems to reflect a positive slope (see solid arrow on graph), a tighter confidence interval and reflects what we know anecdotally is happening in that area, so it is likely the better choice.

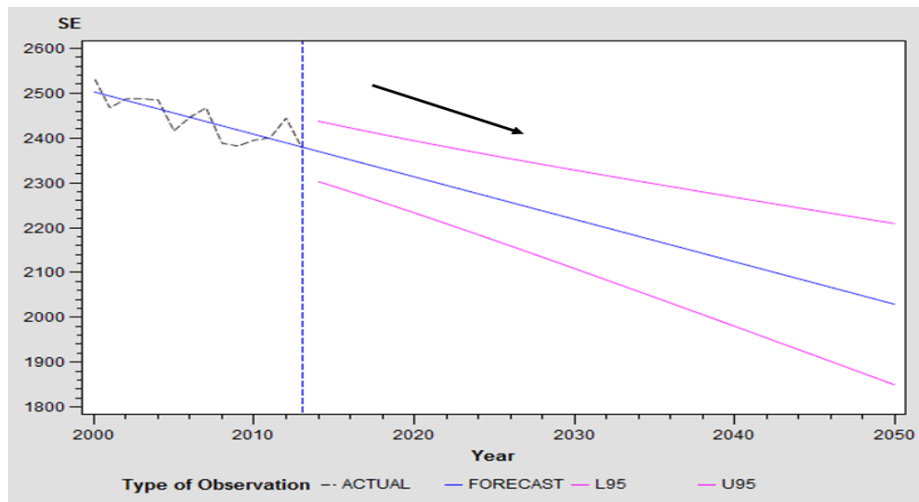


Figure 42: Dimmit Historic SE, negative downward slope

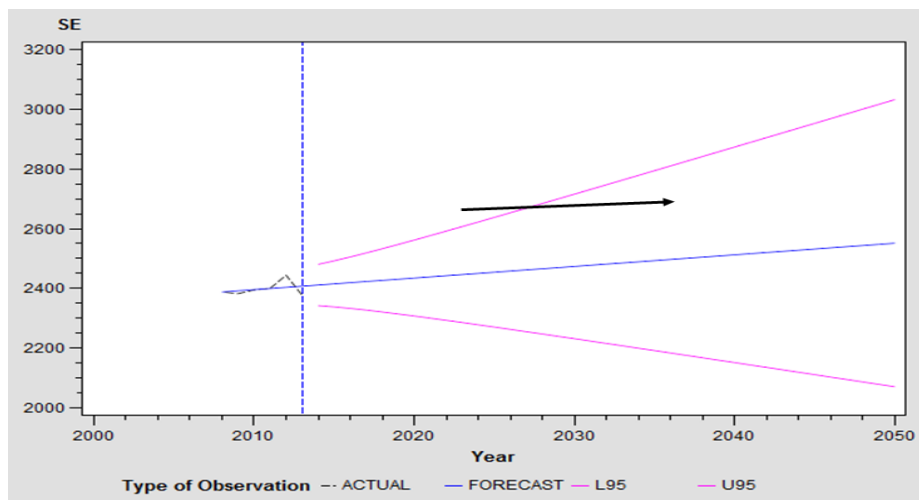


Figure 43: Dimmit Event SE, positive stabilized slope

In reading the bar charts, general relationships can be discerned by comparing the sets of bars. In the example below, from the section on employment, the percent change of labor and of population has been charted. In La Salle County, the blue bar (see left bracket on chart) for percent change in labor, is vastly longer than that for population, in red (see right bracket on chart). This shows that the rate of change in population numbers did not reflect the rate of change that was occurring in laborforce, and that, indeed there is probably a large proportion of population that has moved into the area for work, but has not been counted as residential population across the event period. This pattern is also seen in other counties where EFS activities have ramped up. In counties such as Bexar or Atascosa (see arrow on chart), the percent change in labor and population has remained about the same, reflecting normal growth patterns. In Comal, rate of change in population has been higher than rate of change in labor, perhaps due to families moving into the area, as well as possible commuters who are listed as working in Comal, but living there while working elsewhere. This reflects anecdotal evidence of some EFS workers living in more urban areas and commuting into high employment corridors, such as the I35 Austin-San Antonio corridor or out to EFS areas for work.

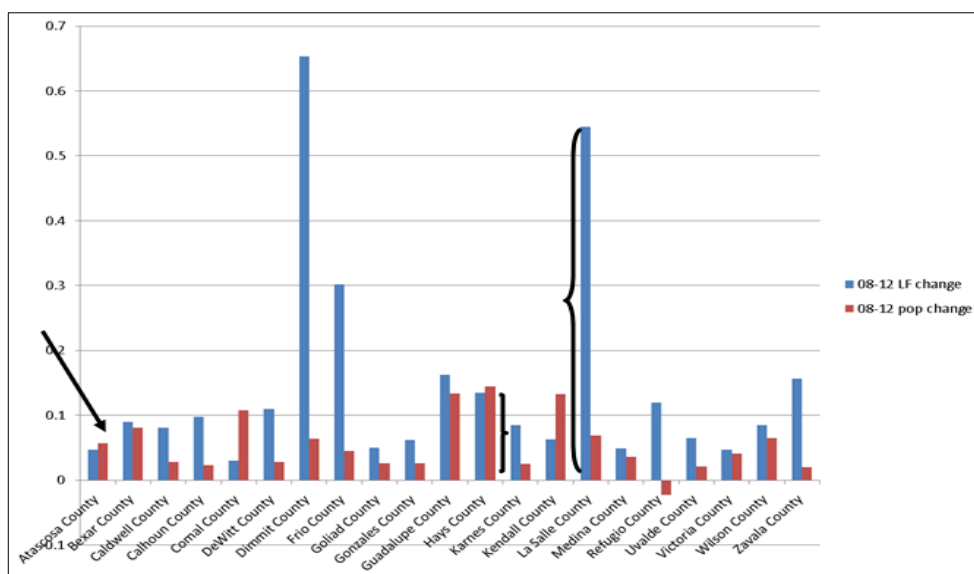


Figure 44: Bars Showing Difference in Rates of change between Employment and Population

Conclusion

This study was conducted by the Center for Community and Business Research (CCBR) to assist the counties of Region L. CCBR hopes to provide an understanding of population data, in regards to planning related to Texas Water Development Board reports. State data used in this report was standard data published for public use that was available when research for the study began. Population projections calculated by the State Demographer's office, under the auspices of the Texas Data Center, continue to be assessed and were recently updated. Any of the content, calculations and methods of analysis in this report can be used and adapted, where necessary, for comparison purposes. As seen in the results and findings, there are many discrepancies between population projections calculated from the characteristics of employment and school enrollment, and some corroborating evidence from housing unit-related data with the population projections based on birth/death/migration formulas used for the State population projection scenarios (0 for normal, .5 for conservative, 1 for aggressive). It is important to note that the B/D/M formula is not faulty, and the other data-set analysis is not "better", but due to associations with U.S. Census counts, different number ranges are to be expected. What this report shows is that there are several counties in Region L that have evidence to support a request for population recounts from the U.S. Census and to support asking for and justifying alternative population data in review documents that will be submitted to the TWDB for the 2013 planning cycle. Significant and substantial rate differences are seen by the findings in this report, which are justifiable reasons for population number adjustment, according to TWDB documentation. This report has also identified areas where local governance may be helpful in tracking changes through tracking systems and records accessibility so that future need of substantiating numbers can be more efficient and available to planners. Water is just one aspect of the impacts being felt by Region L counties in relation to the Eagle Ford Shale activities. As the extraction industry continues to impact the area, streamlined and improved information for planning will be paramount.

It is the hope of this study that the information and discussion related to population projections presented here will serve as a useful tool, not only for the current planning needs for Region L, but also as a resource going forward. CCBR respectfully submits this research in appreciation for the work and attention done by the South Central Texas Region L water planning group, on behalf of one of Texas' most precious resources and the Texas citizens who benefit from its caretaking.

Bibliography

- Aloe Software Group. (2013). District Demographics. Calhoun County ISD. Retrieved April 2, 2013 from: <https://onview.peimsdataplus.com/?hash=Zwb8Fdg9M4Sd57f6>.
- American Fact Finder. (2010). Community Facts: Hondo City, Texas. United States Census Bureau. Retrieved April 12, 2013 from: http://factfinder2.census.gov/faces/nav/jsf/pages/community_facts.xhtml.
- American Fact Finder. (2010). Community Facts: Schertz City, Texas. United States Census Bureau. Retrieved April 4, 2013 from: http://factfinder2.census.gov/faces/nav/jsf/pages/community_facts.xhtml.
- American Fact Finder. (N.D.). Community Facts: New Braunfels City, Texas. United States Census Bureau. Retrieved April 2, 2013 from: http://factfinder2.census.gov/faces/nav/jsf/pages/community_facts.xhtml.
- Bangsund, D., & Hodur, N. (2012). Williston Basin 2012: Projections of Future Employment and Population (Presentation). Fargo, ND: North Dakota State University, Department of Agribusiness and Applied Economics.
- Bangsund, D., & Hodur, N. (2013). Williston Basin 2012: Projections of Future Employment and Population North Dakota Summary. *Agribusiness and Applied Economics Report 704*. Fargo, ND: North Dakota State University, Department of Agribusiness and Applied Economics.
- Baum, C. (March 14, 2012). Politically Incorrect Gas Is Jobs Machine. *Bloomberg News*. Retrieved from: <http://www.bloomberg.com/news/2012-03-14/oil-and-gas-boom-interrupts-greening-of-america-caroline-baum>.
- Berahzer, S., Eskaf, S., and Hughes, J. (2011). Benchmarking Utilities' Rates and Finances for Decision and Policy Makers (Presented at International Water Association 4th Leading Edge Conference on Strategic Asset Management Conference). Mulheim An Der Ruhr, Germany.
- Boerne Independent School District. (N.D.). Board Of Trustees Calls for \$99 Million Bond Election. *Boerne Independent School District: Committed to Excellence*. Retrieved April 5, 2013 from: <http://www.boerne-isd.net/page.cfm?p=11521&newsid=228>.
- Boerne Independent School District. (N.D.). About Us. Boerne Independent School District: Committed to Excellence. Retrieved April 5, 2013 from: <http://www.boerne-isd.net/page.cfm?p=10038>.
- Booth, H. (2006). Demographic Forecasting: 1980 to 2005 in Review. *International Journal of Forecasting*, 22, 547-581.
- Bradbury, J. (1984). The Impact of Industrial Cycles In The Mining Sector: The Case of The Québec-Labrador Region in Canada. *International Journal of Urban and Regional Research*, 8, 311–331.
- Braschler, C., Croll, J. A., Phifer, B., & Kuehn, J. A. (1993). Economic Base Multipliers and Community Growth. University of Missouri. Retrieved from <http://extension.missouri.edu/p/DM3006>
- Bridge, G. (2008). Global Production Networks and the Extractive Sector: Governing Resource-Based Development. *Journal of Economic Geography*, 8, 389-419.
- Brosveen, E. World War II internment camps. *Handbook of Texas Online*. Texas State Historical Association. Retrieved April 15, 2013 from: <http://www.tshaonline.org/handbook/online/articles/quwby>.
- Burchell, R.W., Listokin, D., & Dolphin, W. (2006). Residential Demographic Multipliers: Estimates of the Occupants of New Housing. New Brunswick, NJ: Center for Urban Policy Research,. Rutgers University.

- Bureau of Labor Statistics. (April 17, 2003). Labor Force Data Derived From the Current Population Survey. In *Bureau of Labor Statistics Handbook of Methods*. U.S. Department of Labor. Retrieved from: <http://www.bls.gov/opub/hom/pdf/homch1.pdf>.
- Bureau of Labor Statistics. (February 2004). Explanatory Notes and Estimates of Error. *U.S. Department of Labor*. Retrieved from: http://www.bls.gov/cps/eetech_intro.pdf.
- Bureau of Labor Statistics. (March 18, 2013). Unemployment Rate. U.S. Department of Labor. Retrieved from: <http://www.bls.gov/>.
- Cable News Network. (2013). Best Places to Live: Top 100. *CNN Money*. Retrieved April 4, 2013 from: http://money.cnn.com/galleries/2007/moneymag/0707/gallery.BPTL_top_100.moneymag/40.html.
- Cai, Q., (2007). New Techniques in Small Area Population Estimates by Demographic Characteristics. *Population Research and Policy Review*, 26 (2), 203-218.
- Calhoun County ISD. (2011). Retrieved April 2, 2013 from: <http://www.calcoisd.org/index.php/2011-05-04-20-31-55/mission-statement>.
- California Department of Finance. (May 2012). Methodology for State and County Total Housing Unit Estimates: April 1, 2010 to July 1, 2011. State of California. Retrieved from: <http://www.dof.ca.gov/research/demographic/reports/estimates/e-5/2011-20/>.
- Carlino, G.A. & Mills, E. S. (1987). The Determinants of County Growth. *Journal of Regional Science*, 27, 39–54.
- Carrizo Springs CISD. (N.D.). Carrizo Springs Elementary. *Carrizo Springs CISD*. Retrieved April 3, 2013 from: http://www.cscisd.net/school_CSE/index.htm.
- Carrizo Springs CISD. (N.D.). Retrieved April 3, 2013 from: <http://www.cscisd.net/index.htm>.
- Chesnais, J. (1990). Demographic Transition Patterns and Their Impact on the Age Structure. *Population and Development Review*, 16 (2), 327-336.
- Center for Community and Business Research. (2012). Economic Impact of the Eagle Ford Shale. San Antonio, TX: Institute for Economic Development, University of Texas at San Antonio.
- Center for Urban and Regional Planning Research. (2012). Strategic Housing Analysis: Sustainable Choices for the Growing Demand for Housing in the Eagle Ford Shale Area of South Texas. San Antonio, TX: College of Architecture, University of Texas at San Antonio.
- Center for Community and Business Research. (2012). Workforce Analysis for the Eagle Ford Shale. San Antonio, TX: Institute for Economic Development, University of Texas at San Antonio.
- Center for Community and Business Research. (2013). Economic Impact of the Eagle Ford Shale. San Antonio, TX: Institute for Economic Development, University of Texas at San Antonio.
- Center for Social Research at North Dakota State University. (2012). 2012 North Dakota Statewide Housing Needs Assessment: Housing Forecast (Prepared for North Dakota Housing Finance Agency and its Partners). Fargo, ND.
- Center for Urban and Regional Planning Research. (July 2012). Strategic Housing Analysis: Sustainable Choices for the Growing Demand for Housing in the Eagle Ford Shale Area of South Texas. San Antonio, TX: Institute for Economic Development, South-West Texas Border Small Business Development Center Network & College of Architecture, University of Texas at San Antonio.
- Chesnais, J. (1983). Patterns of Demographic Transition. *Demographic Transition*. Retrieved from: <http://www.popline.org/node/397307>.
- Chesnais, J. (June 1990). Demographic Transition Patterns and Their Impact on the Age Structure. *Population and Development Review*, 16(2).

- City of Gonzales. (2012). Our Community: History. *City of Gonzales Texas*. Retrieved April 4, 2013 from: <http://www.cityofgonzales.org/community.html>.
- City of Gonzales. (2012). Retrieved April 4, 2013 from: <http://www.cityofgonzales.org/index.html>.
- City of Pearsall, Texas. (N.D.). History of Pearsall. *The City of Pearsall*. Retrieved April 3, 2013 from: <http://www.cityofpearsall.org/community/history-of-pearsall/>.
- City of San Antonio. (2013). Retrieved April 15, 2013 from: <http://www.visitsanantonio.com/index.aspx>.
- City of Uvalde. (2011). History of Uvalde, Texas. City of Uvalde: Uvalde, Texas. Retrieved April 12, from: <http://uvaldetx.com/content/history>.
- Coburn, M. (2007). Social & Economic Impacts of the Oil & Gas Industry. Retrieved from: <http://www.pinedaleonline.com/socioeconomic/>
- Cody, S., & Smith, S. (2012). Methodology for Producing Estimates of Total Population for Counties and Subcounty Areas in Florida. Gainesville, FL: University of Florida, Bureau of Economic and Business Research.
- Colon-Lugo, H. (2013). Personal communication. University of Texas at San Antonio
- Combs, S., Texas Comptroller. (N.D.). Accommodating Oil Patch Workers: New Long-Term and Short-Term Housing Options Needed. *The Texas Economy*. Retrieved from: <http://www.thetexasconomy.org/business-industry/business-development/articles/article.php?name=oilPatchHousing>.
- Cotulla Independent School District. (2013). Mission Statement. Ramirez Burks Elementary School. Cotulla Independent School District. Retrieved April 12, 2013 from: <http://www.cotullaisd.org/education/components/docmgr/default.php?sectiondetailid=11238&>.
- Cotulla Independent School District. (2013). Schools. Cotulla Independent School District. Retrieved April 12, 2013 from: <http://www.cotullaisd.org/education/components/sectionlist/default.php?sectiondetailid=6>.
- Cotulla La Salle Chamber of Commerce. (June 14, 2011). Cotulla at a Glance. Cotulla La Salle Chamber of Commerce. Retrieved April 12, 2013 from: <http://www.cotulla-chamber.org/index.php/growth/cotulla-at-a-glance>.
- Crowe, M. (April 13, 2013). Caterpillar Supplier Plans to Open in Victoria, Bring 30 Jobs. *Victoria Advocate*. Victoria Advocate Publishing Co. Retrieved April 15, 2013 from: http://www.victoriaadvocate.com/news/2013/apr/13/mc_ken_garner_041413_206780/D
- ellar, S., & Schreiber, A. (2012). Mining and Community Economic Growth. *The Review of Regional Studies*, 42, 121-141.
- Crystal City Independent School District. (2013). Retrieved April 15, 2013 from: <http://www.crystalcityisd.org/>.
- Crystal City Independent School District. (2013). Retrieved April 15, 2013 from: http://www.crystalcityisd.org/apps/pages/index.jsp?uREC_ID=89078&type=d&pREC_ID=220934&hideMenu=1.
- Cuero Chamber of Commerce. (2012). Turkey Trot Story. Cuero Chamber of Commerce Agriculture & Visitor's Center. Retrieved April 3, 2013 from: <http://www.cuero.org/index.php/typography/history/turkey-trot-story>.
- Cuero Independent School District. (N.D.). Cuero ISD General/Demographic Info. Cuero ISD. Retrieved April 3, 2013 from: http://www.cuero.web1.schoolpointe.com/content_page2.aspx?cid=74.
- Cuero Independent School District. (N.D.). Our Schools. Cuero ISD. Retrieved April 3, 2013 from: <http://www.cueroisd.org/SchoolsList.aspx>.
- Cuero Independent School District. (N.D.). Retrieved April 3, 2013 from: <http://www.cuero.web1.schoolpointe.com/>.

- Cuero Retirement Community. (2013). Demographics. *Visit Cuero, Texas*. Retrieved April 3, 2013 from: <http://www.cueroliving.org/demographics.php>
- Cushing, B. (1999). Migration and Persistent Poverty in Rural America: A Case Study from Central Appalachia. In Kavita Pandit and Susanne D. Withers, eds, *Migration and Restructuring in the United States: A Geographic Perspective*. Lanham, MD: Rowman & Littlefield.
- Dallas Bar Association, Family Law Section. (February 9, 2012). Demographics in Texas: Changes in household characteristics and changes in family structure of the Dallas area. Office of the State Demographer. Retrieved from: http://txsdc.utsa.edu/Resources/Presentations/OSD/2012/2012_02_09_Dallas_Bar_Association.pdf.
- Deller, S. (March 5, 2013). Mining and Community Economic Growth. *The Review of Regional Studies*. Retrieved from: <http://journal.srsa.org/ojs/index.php/RRS/article/view/42.2.3>.
- Deller, S., Schreiber, A. (2012). Frac Sand Mining and Community Economic Development. *Staff Paper Series*. University of Wisconsin-Madison Department of Agricultural and Applied Economics.
- Division of Community and Regional Affairs, State of Alaska. (2012). Municipal Population Estimation, Housing Unit Method Manual: Population Estimate Instructions and Reporting Forms. Juneau, AK: State of Alaska, Department of Commerce, Community, and Economic Development.
- Eagle Ford Shale Blog. (February 4, 2013). New Eagle Ford workforce Housing Coming- Press Release. Retrieved from: <http://eaglefordshale.com/press-releases/new-eagle-ford-workforce-housing-coming-press-release/>.
- Eaglefordshale.com. (2013). Eagle Ford Shale Housing, Lodging and Man Camps. <http://eaglefordshale.com/housing/>
- Eaglefordshale.com. (2013). New Eagle Ford Workforce Housing Coming. <http://eaglefordshale.com/press-releases/new-eagle-ford-workforce-housing-coming-press-releaseEconDevoSA>. (2013). Retrieved April 15, 2013 from: <http://blog.mysanantonio.com/ecodevosa/>.
- Eye on Housing. (August 28, 2012). Improving Markets Index: Victoria, TX MSA. Victoria Economic Development Corporation. Retrieved March 25, 2013 from: <http://www.victoriaedc.org/latest-news/national-association-of-home-builders-highlights-victoria-tx-market/>.
- Falls City Independent School District. (N.D.). About Us. Falls City Independent School District. Retrieved April 5, 2013 from: http://www.fcisd.net/apps/pages/index.jsp?uREC_ID=200650&type=d&pREC_ID=43490
- Fast Health Corporation. (2013). Memorial Medical Center News. Memorial Medical Center. Retrieved April 2, 2013 from: <http://www.mmcporthavaca.com/getpage.php?name=news&sub=About%20MMC>.
- Floresville Independent School District. (N.D.). About Us. Floresville Independent School District: Preparing You for a Prosperous Life. Retrieved April 15, 2013 from: http://www.fisd.us/apps/pages/index.jsp?uREC_ID=192443&type=d&pREC_ID=397641
- Floresville Peanut Association Festival. (2011). Floresville Peanut Festival History. Floresville Peanut Festival. Retrieved April 15, 2013 from: <http://floresvillepeanutfestival.org/history.php>.
- Forbes. (2013). Best Small Places for Business and Careers. Forbes.com. Retrieved April 15, 2013 from: <http://www.forbes.com/places/tx/victoria/#>.
- Freudenburg, W. R. (1992). Addictive Economies: Extractive Industries and Vulnerable Localities in a Changing World Economy. *Rural Sociology*. 57, 305–332.

- Freudenberg, W. (1992). Nothing Recedes Like Success? Risk Analysis and the Organizational Amplification of Risks. *Risk: Issues in Health and Safety*, 3:1-35.
- Freudenberg, William R. and Robert Gramling. (1994). *Oil in Troubled Waters: Perceptions, Politics, and the Battle over Offshore Drilling*. State University of New York Press.
- Freudenburg, W. R. & Gramling, R. (1994). Natural resources and rural poverty: A closer look. *Society & Natural Resources*, 7, 5–22.
- Freudenburg, W. R. & Wilson, L. J. (2002). Mining the Data: Analyzing the Economic Implications of Mining For Nonmetropolitan Regions. *Sociological Inquiry*, 72, 549–575.
- Gilmer, R. (2012). Oil boom in Eagle Ford Shale brings new wealth to south Texas. Federal Reserve Bank of Dallas. Retrieved from: <http://www.dallasfed.org/assets/documents/research/swe/2012/swe1202b.pdf>.
- Gober, P., Lee, S., & Wentz, E. (2010). Space–Time Forecasting using Soft Geostatistics: A Case Study in Forecasting Municipal Water Demand for Phoenix, Arizona. *Stochastic Environmental Research and Risk Assessment*, 24, 283-295.
- Goldberg, E., Wibbels, E. & Mvukiyehe, E. (2008). Lessons from Strange Cases: Democracy, Development, and the Resource Curse in The US States. *Comparative Politics*, 41, 47-514.
- Goliad Chamber of Commerce. (2009). Goliad Texas-History. Goliad County Chamber of Commerce. Retrieved April 4, 2013 from: <http://www.goliadcc.org/index.php/Goliad-TX-Info/goliad-tx-history.html>.
- Goliad Chamber of Commerce. (2009). Goliad Texas-History. Goliad County Chamber of Commerce. Retrieved April 4, 2013 from: <http://www.goliadcc.org/index.php/Goliad-TX-Info/goliad-tx-history.html>.
- Goliad Chamber of Commerce. (2009). Goliad Texas-Market days. Goliad County Chamber of Commerce. Retrieved April 4, 2013 from: <http://www.goliadcc.org/index.php/Goliad-TX-Info/goliad-tx-market-days.html>.
- Goliad Chamber of Commerce. (2009). Retrieved April 4, 2013 from: <http://www.goliadcc.org/>.
- Goliad City Council. (February 5, 2013). Agenda- City of Goliad City Council Meeting. City of Goliad. Retrieved from: <http://www.goliadtx.net/agendas/2-05-2013.pdf>.
- Goliad ISD. (August 2010). Retrieved April 4, 2013 from: http://www.goliadisd.org/index.php?option=com_content&view=article&id=662&Itemid=353.
- Goliad ISD. (August 2012). Retrieved April 4, 2013 from: http://www.goliadisd.org/index.php?option=com_content&view=article&id=1&Itemid=17
- Goliad ISD. (February 2008). Retrieved April 4, 2013 from: http://www.goliadisd.org/index.php?option=com_content&view=article&id=754:gef-mission-a-purpose&catid=123&Itemid=305.
- Gonzales ISD. (2013). Mission. Gonzales Independent School District. Retrieved April 4, 2013 from: http://www.gonzales.txed.net/index.php?option=com_content&view=article&id=64&Itemid=130.
- Gonzales ISD. (2013). Superintendent’s Message 4/1/2013. Gonzales Independent School District. Retrieved April 4, 2013 from: http://www.gonzales.txed.net/index.php?option=com_content&view=article&id=151&Itemid=266.
- Gonzales ISD. (2013). Retrieved April 4, 2013 from: <http://www.gonzales.txed.net/index.php>.
- Gonzales, E. (March 28, 2013). Shipping Containers to House Eagle Ford Workers. *KENS 5 San Antonio*. KENS 5-TV, Inc. Retrieved April 12, 2013 from: <http://www.kens5.com/news/Shipping-containers-to-house-Eagle-Ford-Shale-workers-200437751.html>.

- Gunton, T. I. & Day, J. C. (2003). The Theory and Practice Of Collaborative Planning in Resource and Environmental Management. *Environments: A Journal of Interdisciplinary Studies*, 31(2), 5–19.
- Hays Consolidated I.S.D. (N.D.). District Map. Hays CISD. Retrieved April 5, 2013 from: <http://www.hayscisd.net/schools.cfm?subpage=1442>.
- Hays Consolidated I.S.D. (N.D.). District overview. Hays CISD. Retrieved April 5, 2013 from: <http://www.hayscisd.net/district.cfm?subpage=3968>.
- Heisler, E., & Shrestha, L. (2011). The Changing Demographic Profile of the United States (CRS Report No. RL32701). Washington, DC: Congressional Research Service.
- Hiller, J. (January 30, 2013). La Salle County finds Itself Surfing a Wave of Prosperity. *San Antonio Express-News*. Retrieved from: <http://www.mysanantonio.com/news/energy/article/La-Salle-County-finds-itself-surfing-a-wave-of-4234201.php>.
- Hiller, J. (March 16, 2013). Eagle Ford Fatal Crashes Up 40 Percent. *San Antonio Express-News*. Retrieved from: <http://www.mysanantonio.com/news/energy/article/Eagle-Ford-fatal-crashes-up-40-percent-4359356.php>.
- Hodur, N. & Bangsund, D. (2012). Population Estimates for the City of Williston (Prepared for the City of Williston City Council Meeting December 11, 2012). Fargo, ND: North Dakota State University, Department of Agribusiness and Applied Economics.
- Hollman, F., Mulder, T., Kallan, J. (2000). Methodology and Assumptions for the Population Projections of the United States: 1999 to 2100. *Population Division Working Papers*. United States Bureau of the Census. <http://www.census.gov/population/www/documentation/twps0038/twps0038.html>
- Hondo Independent School District. (2013). Hondo ISD. Hondo ISD. Retrieved April 4, 2013 from: <http://www.hondo.k12.tx.us/?PN=AboutUs>.
- Hoque, N., & Potter, L. (2012). Projections of the Population of Texas and Counties in Texas by Age, Sex and Race/Ethnicity for 2010-2050. Austin, TX: The Texas State Data Center & The Office of the State Demographer.
- Humphreys, M., Sachs, J.D. & Stiglitz, J.E. eds. (2007). Escaping the Resource Curse. Cambridge, UK.: Columbia University Press. Innis, H. (1956). *The Fur Trade in Canada*. Toronto: University of Toronto Press.
- Innis, H., ed: Innis, M. (1956). Essays in Canadian economy history. University of Toronto Press.
- Intellitravel Media, Inc. (2013). Photos: Coolest Small Towns in America. Budget Travel. Retrieved April 3, 2013 from: <http://www.budgettravel.com/slideshow/photos-coolest-small-towns-in-america,7627/#pic=17>.
- James, A. & Aadland, D. (2011). The Curse of Natural Resources: An Empirical Investigation of US Counties. *Resource and Energy Economics*, 33, 440–453.
- Jourdanton ISD. (2013). Retrieved April 2, 2013 from: <http://www.jourdantonisd.net/vnews/display.v/SEC/Elementary>.
- Kamal, A. (2013). Personal communication. University of Texas at San Antonio.
- Karnes City ISD. (2013). Curriculum. Karnes City Independent School District. Retrieved April 5, 2013 from: <http://www.kcisd.net/education/components/whatsnew/default.php?sectiondetailid=2521&linkid=nav-menu-container-1-8923>.
- Karnes City ISD. (2013). Retrieved April 5, 2013 from: <http://www.kcisd.net/education/components/scrapbook/default.php?sectiondetailid=217>&
- Kendall County EDC. (2008). Boerne Facts. Kendall County Economic Development Corporation. Retrieved March 12, 2013 from: <http://www.kendallcountyedc.com/community-profile/boerne-facts>.

- Kendall County EDC. (2008). Demographics. Kendall County Economic Development Corporation. Retrieved March 12, 2013 from: <http://www.kendallcountyedc.com/demographics>.
- Kendall County EDC. (2008). Population. Kendall County Economic Development Corporation. Retrieved March 12, 2013 from: <http://www.kendallcountyedc.com/demographics/population>.
- Kendall County EDC. (2008). Top Employers. Kendall County Economic Development Corporation. Retrieved March 12, 2013 from: <http://www.kendallcountyedc.com/demographics/top-employers>.
- Kenedy ISD. (N.D.). Retrieved April 5, 2013 from: <http://www.kenedy.isd.tenet.edu/>.
- Kenedy ISD. (N.D.). Kenedy ISD Accreditation Status. Kenedy ISD. Retrieved April 5, 2013 from: <http://www.kenedy.isd.tenet.edu/sites/default/files/Required/Accreditation%20Status%20Letter.pdf>
- Kenward, M. & Carpenter, J. (May 2009). Comments On: Missing Data Methods in Longitudinal Studies: A Review. *Test*, 18(1), 65-67.
- Kokesh, J. (March 13, 2013). Pleasanton Votes for School Bond. *Kearney Hub*. Retrieved April 2, 2013 from: http://www.kearneyhub.com/news/local/pleasanton-school-bond-passes/article_ce036668-8b86-11e2-a5c8-0019bb2963f4.html.
- Lee, S., Wentz, E., Gober, P. (2010). Space–Time Forecasting Using Soft Geostatistics: A Case Study in Forecasting Municipal Water Demand for Phoenix, Arizona. *Stochastic Environmental Research Risk Assessment*. 24:283-295.
- Levy, A. (March 31, 2013). Faith is helping to fuel daily life in Eagle Ford. *San Antonio Express-News*. Retrieved from: <http://www.mysanantonio.com/eagleford/article/Faith-is-helping-to-fuel-daily-life-in-Eagle-Ford-4397662.php#photo-4402759>.
- Listokin, D. (2006). New Jersey Demographic Multipliers: The Profile of the Occupants of Residential and Nonresidential Development. New Brunswick, NJ: Rutgers University, Center for Urban Policy Research.
- Listokin, D. & Burchell, R. (2006). Demographic Multiplier: Recent National and State Findings. Arlington, VA: National Impact Fee Round Table National Conference.
- Lockhart Independent School District. (N.D.). Retrieved April 2, 2013 from: http://www.lockhartisd.org/apps/pages/index.jsp?uREC_ID=132579&type=d.
- Lockie, S., Franettovich, M., Petkova-Timmer, V., Rolfe, J., & Galina, I. (2009). Coal Mining and the Resource Community Cycle: A Longitudinal Assessment of the Social Impacts of the Coppabella Coal Mine. *Environmental Impact Assessment Review*, 29, 330–339.
- Long, C. (N.D.). Wilson County. Handbook of Texas Online. Texas State Historical Association. Retrieved April 15, 2013 from: <http://www.tshaonline.org/handbook/online/articles/hcw12>.
- Long, S. (March 17, 2012). Cuero May Soon have Four New Hotels. *Victoria Advocate*. Retrieved from: http://m.victoriaadvocate.com/news/2012/mar/17/sl_cuero_hotels_031812_170564/.
- MacCormack, J. (February 25, 2013). Karnes County Snapshots: Five Lives Impacted by Eagle Ford. *San Antonio Express-News*. Retrieved from: <http://www.mysanantonio.com/eagleford/article/Karnes-County-snapshots-Five-lives-impacted-by-4303394.php>.
- MacCormack, J. (March 24, 2013). Life Often is Lonely in The Eagle Ford 'Trailerhood': For Oil Workers, Housing is Just a Place to Sleep. *San Antonio Express-News*. Retrieved from: <http://www.mysanantonio.com/eagleford/article/Life-often-is-lonely-in-the-Eagle-Ford-4379846.php#photo-4364539>.
- MacCormack, J. (March 31, 2013). Plan of Action Pitched for Eagle Ford Growth. *San Antonio Express-News*. Retrieved from:

- http://www.mysanantonio.com/news/local_news/article/Plan-of-action-pitched-for-Eagle-Ford-growth-4397247.php.
- MacCormack, Z. (January 6, 2013). Residents on Edge as Medina Lake Evaporates. *San Antonio Express News*. Retrieved April 12, 2013 from: http://www.mysanantonio.com/news/local_news/article/Residents-on-edge-as-Medina-Lake-evaporates-4170463.php#photo-3816114.
- Mettendorf, E. (N.D.). A Wendish Pioneer Log Cabin on The Grounds Of The St. Paul's Lutheran Church In Serbin, Texas, USA. Retrieved from: Wikipedia:Contact us/Photo submission.
- Murdock, S.S., Hwang, & Hamm, R. (1995). Component Methods. *Basic Methods for Preparing Small-Area Population Estimates*. Applied Population laboratory. University of Wisconsin.
- Mylar, B. (September 13, 2011). Oil Boom Causing Cell Phone Problems? *KSAT.com*. Retrieved April 12, 2013 from: <http://www.ksat.com/news/Oil-Boom-Causing-Cell-Phone-Problems/-/478452/3855442/-/513jq7z/-/index.html>.
- New Braunfels ISD. (February 1, 2013). Agreement Reached in NBISD and NBU Land Purchase. New Braunfels ISD. Retrieved April 2, 2013 from: <http://www.nbisd.org/default.aspx?name=pi.news>.
- New Braunfels ISD. (February 1, 2013). eSchool News names Moczygemba Tech-Savvy Superintendent. New Braunfels ISD. Retrieved April 2, 2013 from: <http://www.nbisd.org/default.aspx?name=pi.news>.
- New Braunfels ISD. (N.D.). Retrieved April 2, 2013 from: <http://www.nbisd.org/default.aspx?name=dis.homepage>.
- North East Independent School District. (2008). Retrieved April 15, 2013 from: <http://www.neisd.net/community.html>
- North East Independent School District. (2008). Retrieved April 15, 2013 from: <http://www.neisd.net/webmaster/mission.html>.
- Northside ISD. (N.D.). Enrollment figures. Northside ISD: San Antonio's Premier School District. Retrieved April 15, 2013 from: <http://www.nisd.net/schools/enrollment-figures>.
- Northside ISD. (N.D.). Northside ISD: The Destination District. Northside ISD: San Antonio's Premier School District. Retrieved April 15, 2013 from: <http://www.nisd.net/content/northside-isd-destination-district>.
- Northside ISD. (N.D.). Mission & Beliefs. Northside ISD: San Antonio's Premier School District. Retrieved April 15, 2013 from: <http://www.nisd.net/mission-beliefs>.
- Ochoa, R. Zavala County. *Handbook of Texas Online*. Texas State Historical Association. Retrieved April 15, 2013 from: <http://www.tshaonline.org/handbook/online/articles/hcz02>.
- Ochoa, R. (N.D.). Medina County. *Handbook of Texas Online*. Texas Historical Association. Retrieved April 12, 2013 from: <http://www.tshaonline.org/handbook/online/articles/hcm10>.
- Office of the Governor, Economic Development & Tourism. (2011). Texas Hotel Performance Summary: Year of 2011. *Market Texas Tourism*. Retrieved from www.SourceStrategies.org.
- Office of the Governor, Economic Development and Tourism. (2013). Hondo. Texas: It's Like a Whole Other Country. Retrieved April 12, 2013 from: <http://www.traveltex.com/cities/hondo.aspx>.
- Ondracek & Witwer. (2011). Divide County, North Dakota Housing Demand Analysis (Prepared for Crosby Housing Authority and Divide County Jobs Development Authority). Minot, ND.
- O'Neill, B., Balk, D., Brickman, M., and Ezra, M. (2001). A Guide to Global Population Projections. *Demographic Research*, 4, 203-288.

- Online Directory of Texas. (March 30, 2008). Retrieved April 2, 2013 from:
<http://www.bexarcountytexas.us/schooldistrict.htm>.
- Ortega, J., & Poncela, P. (2005). Joint Forecasts of Southern European Fertility Rates with Non-Stationary Dynamic Factor Models. *International Journal of Forecasting*, 21, 539– 550.
- Pack, W. (May 25, 2013). Hotels Booming Along with Oil. *San Antonio Express-News*. Accessed at <http://www.mysanantonio.com/business/article/Hotels-booming-along-with-oil-3586357.php>.
- Passel, J., & Cohn, D. (2008). U.S. Population Projections: 2005-2050. Washington, DC: Pew Research Center.
- Pearsall Independent School District. (2013). Press Release- Public education grant (PEG) letter. Pearsall Independent School District. Retrieved April 3, 2013 from:
<http://www.pearsallisd.org/vnews/display.v/ART/511a66db6d4b6>.
- Pearsall Independent School District. (2013). Retrieved April 4, 2013 from:
<http://www.pearsallisd.org/>.
- Peterson, B. (March 1, 2009). Cotulla Exhibit to Open This Week at LBJ Museum. *San Marcos Mercury*. Retrieved April 12, 2013 from: <http://smmercury.com/2009/03/01/cotulla-exhibit-to-open-this-week-at-lbj-museum/>.
- Pleasanton Independent School District. (2013). Retrieved April 2, 2013 from:
<http://www.pisd.us/?DivisionID=13374&ToggleSideNav=DepartmentOnly>.
- Pleasanton Independent School District. 2012-2013. Retrieved April 2, 2013 from:
<http://www.pisd.us/?PN=AboutUs>
- Pohlen, J. (February 1, 2006). Pearsall: World's Second Largest Peanut. *Oddball Texas: A Guide to Some Really Strange Places*. Chicago Review Press, p. 303.
- Poteet Strawberry Festival Association. (2013). Retrieved April 2, 2013 from:
<http://www.strawberryfestival.com/about-us.html>.
- Potter, L. 2013. Personal communication. University of Texas at San Antonio.
- Putz, A., Finken, A., & Goreham, G. A. (2011). Sustainability in Natural Resource-Dependent Regions That Experienced Boom-Bust-Recovery Cycles: Lessons Learned From a Review of The Literature. Center for Community Vitality. North Dakota State University. Fargo.
- Rathge, R., Danielson, R., Deal, C., Erickson, K., Lazarus, J., Olsen, K., Scwarzwalter, K., & Wiertzema, A. (2012). 2012 North Dakota Statewide Housing Needs Assessment: Housing Forecast. Center for Social Research at North Dakota State University. Retrieved from
http://www.visionwestnd.com/documents/NDSHNA_HousingForecast_Final_000.pdf
- Rayer, S., & Smith, S. (2010). Factors Affecting the Accuracy of Subcounty Population Forecasts. *Journal of Planning Education and Research*, 30, 147-161.
- Rayer, S., & Smith, S. (2010). "Case Study of Florida." *Journal of Planning Education and Research*, 30 (2). 147 - 161
- Rayer, S., Smith, S., & Tayman, J. (2009). Empirical Prediction Intervals for County Population Forecasts. *Population Research and Policy Review*, 28, 773-793.
- Real State Center. Building Permits. Retrieved from <http://recenter.tamu.edu/data/bp>
- Refugio County Texas. (N.D.). Refugio County Texas: Home History Heritage. Retrieved April 4, 2013 from: <http://www.refugiocountytx.org/index.htm>.
- Refugio County Texas. (N.D.). Refugio County Texas: Home History Heritage. Retrieved April 4, 2013 from: <http://www.refugiocountytx.org/index.htm>.
- Refugio ISD. (2007). Refugio High School. Retrieved April 12, 2013 from:
<http://classroom.refugioisd.net/webs/rhs/home.htm>.
- Residential Demographic Multipliers. (March 5, 2013). Estimate New Occupants of New Housing. Retrieved from:
<http://www.dataplace.org/static/pdfs/CONNECTICUT%20multipliers.pdf>.

- Rodriguez, F., Sachs, J.D. (1999). Why Do Resource-Abundant Economies Grow More Slowly? *Journal of Economic Growth*, 4, 277-303. New York: Columbia University Press.
- Roell, C. (N.D.). Victoria County. *Handbook of Texas Online*. Texas State Historical Association. Retrieved April 15, 2013 from: <http://www.tshaonline.org/handbook/online/articles/hcv03>.
- Ross, M. L. (1999). The Political Economy of the Resource Curse. *World Politics*, 51, 297–322.
- Rosser, A. (2006). Escaping the Resource Curse. *New Political Economy*, 11, 557–570.
- Sachs, J.D. & Warner, A. (1999). The Big Push, Natural Resource Booms and Growth. *Journal of Development Economics*, 59, 43–76.
- Sachs, J.D., Warner, A.M. (2001). Natural Resources and Economic Development: The Curse of Natural Resources. *European Economic Review*, Volume 45, p. 827-838.
- San Antonio Area Tourism Council. (2012). Retrieved April 2, 2013 from: <http://www.sanantoniotourism.com/pages/research.html>.
- San Marcos Consolidated Independent School District. (2012). 2012 Fact sheet. Retrieved April 5, 2013 from: <http://www.smcisd.net/files/filesystem/2012%20Fact%20Sheet.pdf>.
- San Marcos Convention and Visitor Bureau. (N.D.). Retrieved April 5, 2013 from: <http://www.toursanmarcos.com/attractions/index.html>.
- San Marcos Convention and Visitor Bureau. (N.D.). Retrieved April 5, 2013 from: <http://www.toursanmarcos.com/visitor-information/index.html>.
- Sass, D. (2013). Personal communication. University of Texas at San Antonio.
- Schafer, J. (February 1999). Multiple Imputations: A Primer. *Statistical Methods in Medical Research*, 8(1), 3-15.
- Schertz Chamber of Commerce. (2009). Historic Schertz: Origins. *Schertz Chamber of Commerce: Building a Better Tomorrow*. Retrieved April 4, 2013 from: <http://www.schertzchamber.org/history.htm>.
- Schertz-Cibolo Universal City Independent School District. (N.D.). Retrieved April 4, 2013 from: <http://www.scuc.txed.net/index.cfm>.
- Schertz-Cibolo Universal City Independent School District. (N.D.). Bond 2013. Schertz-Cibolo Universal City. Retrieved April 4, 2013 from: <http://www.scuc.txed.net/faq.cfm>.
- Schlottmann, A., Schmidt, B., & Swanson, D. (2010). Forecasting the Population of Census Tracts by Age and Sex: An Example of the Hamilton-Perry Method in Action. *Population Research and Policy Review*, 29, 47-63.
- Schlottmann, A., Schmidt, B., & Swanson, D. (2011). Evaluating Population Forecast Accuracy: A Regression Approach Using County Data. *Population Research and Policy Review*, 30, 235-262.
- Seifert, L. (2010). A Basic Analysis of the Bakken Oil Boom: Precautions and Planning. Retrieved from: http://wbpc.ca/+pub/document/archived-talks/2010/Bakken_Precautions_and_Planning_-_Seifert.pdf.
- Seguin Convention & Visitors Bureau. (2011). History & Legends: A Richly Layered History and a Modern Present. *Seguin: There's a Story Here*. Retrieved April 4, 2013 from: <http://www.visitseguin.com/about.cfm?p=1&b=2>.
- Seguin Independent School District. (2013). Retrieved April 4, 2013 from: <http://www.seguin.k12.tx.us/default.aspx?name=homepage>.
- Seguin Independent School District. (2013). Retrieved April 4, 2013 from: <http://www.seguin.k12.tx.us/default.aspx?name=homepage>.
- Slavik, C. (2013). Goliad City Administrator Position Still Vacant. *Beeville Bee-Picayune*. Radiate Media. Retrieved from: http://www.mysoutex.com/view/full_story/21587111/article-Goliad-city-administrator-position-still-vacant.
- Smith, S. (1986). A Review and Evaluation of the Housing Unit Method of Population Estimation. *Journal of the American Statistical Association*, 81 (394), 287-296.

- Source Strategies Inc. (2011). Texas Hotel Performance Summary: Year of 2011 (Prepared for Market Texas Tourism, Office of the Governor, Economic Development & Tourism). San Antonio, TX.
- SRF Consulting Group. (2012). Planning and Zoning Training (Prepared for Vision West North Dakota).
- State & County QuickFacts. (March 11, 2013). DeWitt County, Texas, United States Census Bureau. Retrieved April 3, 2013 from: <http://quickfacts.census.gov/qfd/states/48/48123.html>.
- State & County QuickFacts. (March 11, 2013). Dimmit County, Texas. United States Census Bureau. Retrieved April 3, 2013 from: <http://quickfacts.census.gov/qfd/states/48/48127.html>.
- State & County QuickFacts. (March 11, 2013). Floresville city, Texas. United States Census Bureau. Retrieved April 15, 2013 from <http://quickfacts.census.gov/qfd/states/48/4826160.html>.
- State & County QuickFacts. (March 11, 2013). Goliad County, Texas. United States Census Bureau. Retrieved April 4, 2013 from: <http://quickfacts.census.gov/qfd/states/48/48175.html>.
- State & County QuickFacts. (March 11, 2013). Hays County, Texas. United States Census Bureau. Retrieved April 5, 2013 from: <http://quickfacts.census.gov/qfd/states/48/48209.html>.
- State & County QuickFacts. (March 11, 2013). Karnes County, Texas. United States Census Bureau. Retrieved April 5, 2013 from: <http://quickfacts.census.gov/qfd/states/48/48255.html>.
- State & County QuickFacts. (March 11, 2013). Medina County, Texas. United States Census Bureau. Retrieved April 12, 2013 from: <http://quickfacts.census.gov/qfd/states/48/48325.html>.
- State & County QuickFacts. (March 11, 2013). San Antonio (city), Texas. United States Census Bureau. Retrieved April 15, 2013 from: <http://quickfacts.census.gov/qfd/states/48/4865000.html>.
- State & County QuickFacts. (March 11, 2013). Uvalde County, Texas. United States Census Bureau. Retrieved April 12, 2013 from: <http://quickfacts.census.gov/qfd/states/48/48463.html>.
- State & County QuickFacts. (March 11, 2013). Victoria County, Texas. United States Census Bureau. Retrieved April 12, 2013 from: <http://quickfacts.census.gov/qfd/states/48/48469.html>.
- State & County QuickFacts. (March 11, 2013). Wilson County, Texas. United States Census Bureau. Retrieved April 15, 2013 from: <http://quickfacts.census.gov/qfd/states/48/48493.html>.
- State & County QuickFacts. (March 11, 2013). Zavala County, Texas. United States Census Bureau. Retrieved April 15, 2013 from: <http://quickfacts.census.gov/qfd/states/48/48507.html>.
- Tayman, J., Smith, S. K., & Rayer, S. (2011). Evaluating Population Forecast Accuracy: A Regression Approach Using County Data. *Population Research and Policy Review* 30: 235–262.
- Texas Education agency. Austin, TX. Retrieved From <http://www.tea.state.tx.us/>
- Texas Escapes. (February 14, 2009). Crystal City, Texas. *Texas Escapes Online Magazine*. Blueprints for Travel, Inc. Retrieved April 15, 2013 from: <http://www.texasescapes.com/SouthTexasTowns/Crystal-City-Texas.htm>.
- Texas Comptroller of Public Accounts. Hotel Occupancy Tax Receipts. Retrieved from: <http://www.window.state.tx.us/taxinfo/hotel/>

- Texas Comptroller of Public Accounts. Texas Taxes. Retrieved in 2013 from:
<http://www.window.state.tx.us/taxinfo/sales/>
- Texas Secretary of State. (N.D.). Turnout and Voter Registration Figures 1970-Current. Texas Secretary of State. Retrieved from: <http://www.sos.state.tx.us/elections/historical/70-92.shtml>.
- Texas Secretary of State. (N.D.). Voter Registration Figures 1991- Present. Texas Secretary of State. Retrieved from: <http://www.sos.state.tx.us/elections/historical/vrfig.shtml>.
- Texas State Data Center, Office of the State Demographer, 2012. Projections of the Population of Texas and Counties in Texas by Age, Sex and Race/Ethnicity for 2010-2050. Retrieved 2013 from: <http://txsdc.utsa.edu/Data/TPEPP/Projections/Methodology.pdf>
- Texas State Historical Association. (N.D.). DeWitt County. The Handbook of Texas Online. Retrieved April 3, 2013 from: <http://www.tshaonline.org/handbook/online/articles/hcd07>.
- Texas State Historical Association. (N.D.). Karnes County. Handbook of Texas Online. Retrieved April 5, 2013 from: <http://www.tshaonline.org/handbook/online/articles/hck01>.
- Texas State University-San Marcos. (N.D.). Points of Pride. Texas State University-San Marcos. Retrieved April 5, 2013 from:
http://www.txstate.edu/about/25points.html#distinguished_alumni.
- Texas Tours. (N.D.). Mailbox at Old Magnolia Town in Palestine, Texas. Round America Trip. Unknown. (N.D.) Old Gilmer Hotel, Rocksprings, Texas Historical Marker.
- Texas Water Development Board. (2013). Projection Methodology- Draft Population and Municipal Water Demands. Retrieved from:
<http://www.lrgvdc.org/downloads/water/FINAL%20RWPG%20Chairs%20-%20Draft%20Projection%20Methodology%20v03-05-13.pdf>.
- The City of Carrizo Springs. (2013). Retrieved April 3, 2013 from: <http://www.cityofcarrizo.org/>.
- The City of Lockhart. (2005). Retrieved April 2, 2013 from: <http://www.lockhart-tx.org/web98/visitors/bbqcapitaloftexas.asp>
- The City of Seguin. (2011). Seguin Lives- ICMA Recognition (video file). City of Seguin Texas. Retrieved April 4, 2013 from: <http://www.seguintexas.gov/>.
- The Cuero Turkeyfest Association. (2012). A Brief History on The Turkey Capitol of the World. Turkeyfest. Retrieved April 3, 2013 from: <http://www.turkeyfest.org/about.html>.
- The Greater New Braunfels Chamber of Commerce, Inc. (2013). Retrieved April 2, 2013 from: <http://www.nbcham.org/>.
- Unknown. (ca. 1905-1915). Old Texas “Dog Run” House Log Cabin [Llano County, Texas]. Lawrence T. Jones Photography Collection.
- USA.com (2012). Texas Average Household Size City Rank. World Media Group, LLC. Retrieved in 2013 from: <http://www.usa.com/rank/texas-state--average-household-size--city-rank.htm?hl=Fort+Worth&hlst=TX&yr=8000>.
- U.S. Bureau of the Census. (1985). Evaluating Censuses of Population and Housing. (Statistical Training Document ISP-TR-5). Washington, DC.
- U.S. Bureau of the Census. (2004). Housing Data between the Censuses: The American Housing Survey (Census Special Report AHS/R/04-1). Washington, DC.
- U.S. Bureau of the Census. (May 26, 2011). Census Bureau Releases 2010 Census Demographic Profiles for the United States, Arkansas, Illinois, Indiana, Iowa, Louisiana, Maryland, New Jersey, Oklahoma, Oregon, South Dakota, Texas, Vermont and Virginia. *Newsroom*. United States Census Bureau. Retrieved from:
http://www.census.gov/newsroom/releases/archives/2010_census/cb11-cn144.html.
- U.S. Bureau of the Census. (May 26, 2011). Demographic Profile Texas. Retrieved from:
http://www2.census.gov/census_2010/03-Demographic_Profile/Texas/.
- U.S. Bureau of the Census. (2012). Methodology and Assumptions for the 2012 National Projections. Washington, DC.

- USBC. 2013. Oil and Gas Boom Driving Population Growth in the Great Plains, Census Bureau Estimates Show. Retrieved from: <http://www.census.gov/newsroom/releases/archives/population/cb13-46.html>
- U.S. Geological Survey. (2008). 3 to 4.3 Billion Barrels of Technically Recoverable Oil Assessed in North Dakota and Montana's Bakken Formation—25 Times More Than 1995 Estimate. Retrieved from: <http://www.usgs.gov/newsroom/article.asp?ID=1911>.
- Uvalde Consolidated Independent School District. (N.D.). Migrant Program. Uvalde Consolidated Independent School District. Retrieved April 12, 2013 from: http://ucisd.net/apps/pages/index.jsp?uREC_ID=86966&type=d&pREC_ID=164929.
- Uvalde Consolidated Independent School District. (N.D.). Mission Statement. Uvalde High School. Retrieved April 12, 2013 from: http://uhs.ucisd.net/apps/pages/index.jsp?uREC_ID=95488&type=d&pREC_ID=179867.
- Uvalde Consolidated Independent School District. (N.D.). Uvalde Consolidated Independent School District. Retrieved April 12, 2013 from: <http://ucisd.net/>.
- Veokoff, V., & Vincent G. (2010). The Next Four Decades, the Older Population in the United States: 2010 to 2050 Population Estimates and Projections (Document P25-1138). Washington, DC: U.S. Bureau of the Census.
- Victoria Chamber of Commerce. (2013). Victoria History. Victoria, TX Chamber of Commerce. Retrieved April 15, 2013 from: <http://www.victoriachamber.org/victoria-history/>.
- Victoria Chamber of Commerce. (2013). Victoria History. Victoria, TX Chamber of Commerce. Retrieved April 15, 2013 from: <http://www.victoriachamber.org/victoria-history/>.
- Victoria Independent School District. (2013). VISD Administrator Named Outstanding Assistant Principal of the Year. Victoria Independent School District. Retrieved April 15, 2013 from: http://www.visd.com/visdNews/2012/091712_APofYear.asp.
- Victoria Independent School District. (2013). VISD Campus Information. Victoria Independent School District. Retrieved April 15, 2013 from: <http://www.visd.com/campuses/index.asp>.
- Victoria Independent School District. (2013). VISD Superintendent. Victoria Independent School District. Retrieved April 15, 2013 from: <http://www.visd.com/superintendent/>.
- Water and Sanitation Program. (2010). A Review in Bangladesh, India, and Pakistan, Benchmarking for Performance Improvement in Urban Utilities. Washington, DC: World Bank.
- Watts, M. (2005). Righteous Oil?: Human Rights, The Oil Complex and Corporate Social Responsibility. *Annual Review of Environment and Resources*, 30, 373–407.
- Welch, K. (May 19, 2012). Booming business: Jobs increase, towns thrive as result of oil, gas spike. *Amarillo Globe-News*. Retrieved from: <http://amarillo.com/news/local-news/2012-05-19/booming-business>.
- Western North Dakota Energy Project. (2013). *Hettinger County Shale Projections* (Prepared for Vision West Shale Projection Webinar Series). Retrieved from: <http://www.visionwestnd.com/webinars.asp>.
- Zhou, S. 2013. Personal communication. University of Texas at San Antonio.

SECTION V

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Glossary

From: <http://www.bls.gov/bls/glossary.htm>

Base period

A point in time used as a reference point for comparison with some later period.

Cohort (National Longitudinal Surveys)

A cohort in the BLS National Longitudinal Surveys (NLS) program is a group of people, defined by year of birth, that make up a particular study. For example, the National Longitudinal Survey of Youth 1979 (NLSY79) cohort consists of people born between January 1, 1957, and December 31, 1964.

Contingent workers (Current Population Survey)

Workers who do not have an implicit or explicit contract for long-term employment. BLS uses three alternative measures of contingent workers that vary in scope. More information <http://www.bls.gov/news.release/History/conemp.txt>

Discouraged workers (Current Population Survey)

Persons not in the labor force who want and are available for a job and who have looked for work sometime in the past 12 months (or since the end of their last job if they held one within the past 12 months), but who are not currently looking because they believe there are no jobs available or there are none for which they would qualify.

Displaced workers (Current Population Survey)

Persons 20 years and over who lost or left jobs because their plant or company closed or moved, there was insufficient work for them to do, or their position or shift was abolished.

Employed persons (Current Population Survey)

Persons 16 years and over in the civilian noninstitutional population who, during the reference week, (a) did any work at all (at least 1 hour) as paid employees; worked in their own business, profession, or on their own farm, or worked 15 hours or more as unpaid workers in an enterprise operated by a member of the family; and (b) all those who were not working but who had jobs or businesses from which they were temporarily absent because of vacation, illness, bad weather, childcare problems, maternity or paternity leave, labor-management dispute, job training, or other family or personal reasons, whether or not they were paid for the time off or were seeking other jobs. Each employed person is counted only once, even if he or she holds more than one job. Excluded are persons whose only activity consisted of work around their own house (painting, repairing, or own home housework) or volunteer work for religious, charitable, and other organizations.

See: <http://www.bls.gov/cps/lfcharacteristics.htm#emp>

Employed persons (American Time Use Survey)

Same as definition for Employed persons (Current Population Survey), EXCEPT that in the American Time Use Survey, the definition includes persons 15 years and over and the reference period is the last 7 days prior to the American Time Use Survey interview.

Employment-population ratio (Current Population Survey)

The proportion of the civilian noninstitutional population aged 16 years and over that is employed.

Full-time employees (National Compensation Survey)

Employees are classified as full time or part time as defined by their employer.

Full-time workers (Current Population Survey and American Time Use Survey)

Persons who work 35 hours or more per week.

Hire (Job Openings and Labor Turnover Survey)

Any addition to an establishment's payroll, including newly hired and rehired employees.

Hires rate (Job Openings and Labor Turnover Survey)

The number of hires during the month divided by the number of employees who worked during or received pay for the pay period that includes the 12th of the month.

Labor force (Current Population Survey)

The labor force includes all persons classified as employed or unemployed in accordance with the definitions contained in this glossary.

See: <http://www.bls.gov/cps/lfcharacteristics.htm#laborforce>

Labor force participation rate

The labor force as a percent of the civilian noninstitutional population.

Marginally attached workers (Current Population Survey)

Persons not in the labor force who want and are available for work, and who have looked for a job sometime in the prior 12 months (or since the end of their last job if they held one within the past 12 months), but were not counted as unemployed because they had not searched for work in the 4 weeks preceding the survey. Discouraged workers are a subset of the marginally attached. (See Discouraged workers.)

Panel data (National Longitudinal Surveys and Business Employment Dynamics)

See Longitudinal data.

Payroll employment (Current Employment Statistics)

Employment is the total number of persons on establishment payrolls employed full or part time who received pay for any part of the pay period which includes the 12th day of the month.

Temporary and intermittent employees are included, as are any workers who are on paid sick leave, on paid holiday, or who work during only part of the specified pay period. A striking worker who only works a small portion of the survey period, and is paid, would be included as employed under the CES definitions. Persons on the payroll of more than one establishment are counted in each establishment. Data exclude proprietors, self-employed, unpaid family or volunteer workers, farm workers, and domestic workers. Persons on layoff the entire pay period, on leave without pay, on strike for the entire period or who have not yet reported for work are not counted as employed. Government employment covers only civilian workers. With the release of NAICS-based estimates in June 2003, the scope and definition of Federal Government employment estimates changed due to a change in source data and estimation methods. The previous series was an end-of-month federal employee count produced by the Office of Personnel Management, and it excluded some workers, mostly employees who work in Department of Defense-owned establishments such as military base commissaries. Beginning in June 2003, the CES national series began to include these workers. Also, Federal Government employment is now estimated from a sample of Federal establishments, is benchmarked annually to counts from unemployment insurance tax records, and reflects employee counts as of the pay period including the 12th of the month, consistent with other CES industry series. The historical time series for Federal Government employment was revised to reflect these changes.

Sample

A subset of a universe; usually selected randomly and considered representative of the universe.

Sample frame

A listing of all units in the universe from which a sample can be drawn.

Seasonally adjusted

Seasonal adjustment removes the effects of events that follow a more or less regular pattern each year. These adjustments make it easier to observe the cyclical and other nonseasonal movements in a data series.

Self-employed persons (Current Population Survey and American Time Use Survey)

Those persons who work for profit or fees in their own business, profession, trade, or farm. Only the unincorporated self-employed are included in the self-employed category.

Series report

A form-based application that uses BLS time series identifiers as input in extracting data from each survey-specific database according to a specified set of date ranges and output options.

Supply of workers

Often refers to the labor force. The concept focuses on worker characteristics, especially their education and training, but also characteristics such as experience (often considered to be correlated with age), physical strength (often considered to be inversely correlated with age), ability to work in teams, etc. Some demographic characteristics that are not to be considered in hiring and promotion decisions, but that are studied, include gender, race, ethnicity, parental and marital statuses. More information (PDF)

Unemployed persons (Current Population Survey)

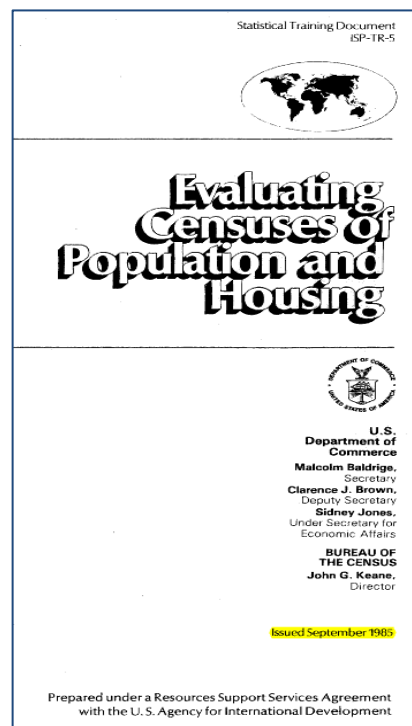
Persons aged 16 years and older who had no employment during the reference week, were available for work, except for temporary illness, and had made specific efforts to find employment sometime during the 4-week period ending with the reference week. Persons who were waiting to be recalled to a job from which they had been laid off need not have been looking for work to be classified as unemployed.

Universe

The total number of units (for example, individuals, households, or businesses) in the population of interest.

Wage and salary workers

Workers who receive wages, salaries, commissions, tips, payment in kind, or piece rates. The group includes employees in both the private and public sectors.



USA_Evaluating_Censuses, 1985; see also: U.S. Census Methodology and Updates, 2012

ACCURACY: Range of census variation or the degree of conformity of the census count to the actual number of persons or housing units.

AGGREGATES: Individual observations (or statistics) combined into a total number.

ASSIGNABLE VARIATION: Variation attributable to causes other than chance.

BIAS: Difference between the expected value of a statistic and its true value.

CHANDRASEKARAN-DEMING TECHNIQUE: Procedure to estimate the coverage of two independent systems collecting information about demographic or other events, based on the assumption that

the probability of an event being recorded by one system is the same regardless of whether the event is recorded by the other system. The events from both systems are matched to establish M , the number of events recorded by both systems; U_1 , the number recorded only by system 1; and U_2 , the number recorded only by system 2. The Chandrasekaran-Deming formula then estimates total events, N , as

$$N_{\text{hat}} = M[\textit{number of events}] + U_1 [\textit{system 1}] + U_2 [\textit{system 2}] + U_1 U_2 / M [\textit{emphasis added}]$$

- COEFFICIENT OF VARIATION (CV):** Standard error divided by the population parameter being estimated; another name for "relative standard error."
- COHORT:** Group of persons who experienced the same class of events in the same period. Thus, an age cohort is a group of people born during a particular period, and a marriage cohort is a group of people who married during a particular period. The effects of a given set of mortality or fertility rates are often illustrated by applying them to hypothetical cohorts.
- CONFIDENCE INTERVAL:** Interval within one standard error (two-thirds confidence interval) of the estimate or two standard errors (95 percent confidence interval).
- CONTENT ERROR:** Error in the characteristics that are reported for those persons or housing units that are enumerated.
- CORRELATION BIAS:** Result of failure to achieve independence between the complete enumeration and the coverage evaluation survey.
- COVERAGE ERROR:** Error in an estimate that results from (a) failure to include in a census or a survey all eligible units or (b) inclusion of some units erroneously.
- DE FACTO POPULATION:** Population enumerated on the basis of those present at a particular time, including temporary visitors and excluding residents temporarily absent.
- DUAL SYSTEM ESTIMATION:** Preparation of estimates by matching, on a case-by-case basis, two different and independent sources which describe the same events. The matching permits an estimate of the number of cases reported by one source but not the other.
- EXPECTED VALUE:** Average value of sample estimates over all independent repetitions.
- FREQUENCY DISTRIBUTION:** Distribution of estimates from a sample.
- GROWTH RATE:** The increase or decrease of a population in a period divided by the number of person-years lived by the population during the same period. The increase in a population is the result of a surplus (or deficit) of births over deaths and of immigrants over emigrants.
- HOUSEHOLD:** A person or group of related or unrelated persons who make common provision for food and other necessities for living.
- HOUSING UNIT:** A single room or group of rooms, or other space arranged for human habitation, occupied or intended for occupancy as separate and independent living quarters by a person living alone or a group of persons living together.
- IMPUTATION:** Process whereby missing or inconsistent data are replaced by estimated values that are derived by considering other related data items that are present.
- MATCH:** Comparison of records for an individual person or housing unit from the census and from the evaluation survey. If the responses agree or are all within a predetermined tolerance, the records are considered a "match."
- MATCHING BIAS:** Bias in the estimate of the coverage of the census due to incorrect outcomes of the matching process.
- MEDIAN:** The value associated with the central member of a set that is ordered by size or some other characteristic expressed in numbers.
- MIGRATION RATE:** Number of migrants during a specified period divided by the person-years lived of the population exposed to migration.
- NET ERROR:** The difference between the census count for any category and the correct count for that category.
- NET MIGRATION:** The difference between gross immigration and gross emigration.

- NONSAMPLING ERROR*: Error from a source other than sampling, such as imperfect selection, bias in response or estimation, errors of observation and recording, data keying and tabulation errors, etc.
- OUT-Of-SCOPE BIAS*: Bias that arises from the erroneous inclusion of out-of-scope persons or housing units among the reports of either of two sources used in the matching operation.
- OVERCOUNT*: Type of coverage error in which persons or housing units are enumerated (counted) more than once or are enumerated when they should not be.
- PARAMETER*: Unknown quantity to be estimated.
- RECORD CHECK*: Comparison of census data for an individual or household with independent records for the same person or household.
- RESPONSE BIAS*: Difference between the expected value of the statistic and its true value.
- RESPONSE CORRELATION BIAS*: Source of bias arising from a failure to maintain independence between two collection systems.
- RESPONSE ERROR*: Difference between reported answers and correct answers.
- RESPONSE VARIANCE*: Average of the squared differences between the values of a statistic for the individual repetitions and the expected value of these observations over a large number of repetitions.
- RUBUSTNESS*: A characteristic of estimates that are not greatly affected by deviations from the assumptions on which the estimation procedure is based.
- SAMPLING ERROR*: The difference between a population value and an estimate thereof, derived from a random sample, which is due to the fact that only a sample of values is observed.
- STABLE POPULATION*: A population exposed for a long time to constant fertility and mortality rates, and closed to migration, establishes a fixed age distribution and constant growth rate characteristic of the vital rates.
- STANDARD ERROR*: Measure of dispersion of an estimate from the expected value.
- TOTAL ERROR*: The sum of the coverage and content errors in the census count for any category.
- TRUE VALUE*: Value which producers of a statistic intended to measure.
- VARIANCE*: Square of the standard error or average of the squared differences between the values of the statistic on the individual repetitions and the expected value of these observations taken over a large number of repetitions.

About the Center for Community & Business Research

The Center for Community and Business Research (CCBR) is one of ten centers within the University of Texas at San Antonio's Institute for Economic Development. Each center is specifically designed to address different economic, community, and small to medium sized business development needs. CCBR conducts regional evaluation, assessment, and long-term applied research on issues related to community and business development.

CCBR serves the needs of economic development agencies, workforce development boards, businesses, associations, city, state and federal governments and other community stakeholders in search of information to make better informed decisions.

CCBR develops, conducts, and reports on research projects that shed light on how organizations, communities, or the economy work. This is done through the use of various techniques including, but not limited to:

- Economic impact analyses
- Feasibility studies
- Surveys of business and community organizations
- Community Development studies
- Transportation studies
- EB-5 Regional Center studies
- Analysis of secondary data
- Report writing and presentation

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The mission of the Institute for Economic Development is to provide ongoing consulting, training, technical, research and information services in tandem with University-based assets and resources and other state, federal and local agencies, to facilitate economic, community and business development throughout South Texas and the Border Region.

Working together to build the economy one business at a time.

